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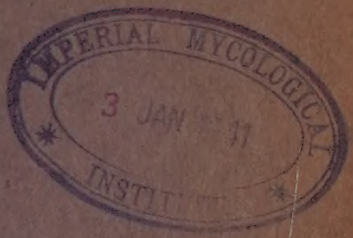

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The Editor will be glad to receive publications relating to Veterinary Science and cognate subjects in order that they may be dealt with in the *Veterinary Bulletin*.

Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.

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THE

VETERINARY BULLETIN

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DISEASES CAUSED BY BACTERIA AND FUNGI

I. Forssman, J. (1933). Studien über das Staphylolysin. [**Studies in Staphylococci**].—*Biochem. Z.* **265.** 291–319. 7 figs., 17 tables.

II & III. Forssman, J. (1934). Staphylolysinstudien II. Dritte Mitteilung. [**Studies in Staphylococci. II & III**].—*Acta path. microbiol. scand.* **11.** 214–226 and 452–466. 9 tables. [4 refs.] [In German].

IV. Forssman, J. (1935). **Studies in Staphylococci. IV. Staphylococcus Immunity.**—*Ibid.* **12.** 536–550. 3 tables. [9 refs.] [In English].

V. Flaum, A., & Forssman, J. (1936). **Studies in Staphylococci. V. Experimental Investigations of Staphylolysin.** —*Ibid.* **13.** 263–272. 3 tables. [4 refs.] [In English].

VI, VII & VIII. Forssman, J. (1936). **Studies in Staphylococci. VI. On the Course of Staphylococcus Infection in Normal and Immunised Rabbits. VII. On Active Immunity against Staphylococcal Infections and its Relation to known Antibodies against Staphylococci or Products of these Bacteria. VIII. On the Aspecific and Specific Effect of Sera against Staphylococci.**—*Ibid.* 453–458, 459–485 and 486–501. 9 figs., 6 tables. [18 refs.] [In English].

IX. For part IX, see *V. B.* **8.** 408.

X. Forssman, J. (1937). Staphylokokkenstudien X. Verbreitung der Staphylokokken in Kaninchen nach intravenösen Injektionen von Staphylokokken. [**Studies on Staphylococci. X. Distribution of Staphylococci in Rabbits after Intravenous Injection**]. — *Z. Immun-Forsch.* **91.** 165–175. 4 tables.

XI. Forssman, J. (1938). **Studies in Staphylococci. XI. What Rôle do Staphylococcus Lysin against Rabbit's Blood Corpuscles and Its Antilysin Play in Staphylococcus Infections in Human Beings?**—*Acta path. microbiol. scand.* **15.** 184–197. 4 tables. [14 refs.] [In English].

This series of papers covers F.'s studies on staphylococci from 1933–1938 with regard to the various lysins produced by this organism and their relation to staphylococcus immunity. Only a brief summary of his earlier findings regarding the various lysins will be given, as much further information has accrued from various sources since this work was done; greater attention will be paid to his studies and views on staphylococcus immunity.

I–III. F. reports here that the activity of the staphylococcus lysin decreases about proportionately to its dilution but increases proportionately with an increase of lysable corpuscles, and that whilst in general staphylolysin [regarded at this date as an entity—see further under V] shows its greatest activity when allowed to act at 37°C. followed by a period at a lower temperature, it acts nearly equally well on certain corpuscles, *e.g.* sheep, at 0°C. [see further under V]. Adsorption of the lysin may be very great or absent and this not only with sensitive but also with resistant cells, and F. takes the view that there is no real adsorption such as occurs in other immunity reactions. At 0°C. with certain sensitive bloods,

e.g. sheep, a temporary binding occurs, but is broken quickly. A similar chain of events is believed to occur with rabbit cells, but cannot be detected, possibly because the process of binding and loosing is so rapid as to escape detection by the methods used. Great variation is found in the behaviour of lysin from different strains of staphylococcus or in different brews from the same strain. F. believes that the process has the character of an enzyme action (or that an activation of the lysin is produced by the blood corpuscles).

IV. It is concluded that, although antibodies play an active part in staphylococcus immunity and these protective antibodies can be transferred passively by means of sera, they are distinct from other known antibodies. They have a developmental curve which is different from that of other antibodies, developing much later and at a time when other antibodies, *viz*, opsonins, agglutinins, antilysins etc. are decreasing and are already very low. Exception is taken in particular to the view that antilytic activity is a measure of probable therapeutic activity, and in support of this it is shown that certain highly protective sera possessed no antilysins (for sheep cells). It is also shown that the destruction of staphylococci in the immunized animal is a slow process, a parallel being drawn with the immunity and the slow destruction of the causal organism in anthrax immune animals.

V. In agreement with Bigger (1933), and Glenny and Stevens [*V. B.* **6.** 484.], F. finds that the different effect of staphylococcus lysins on different corpuscles and their different immunizing properties are due to the fact that more than one type of lysin exists, probably several. He regards the existence of these several types of haemolysin as a further reason for not attaching exclusive importance to a test for one, *viz*, that which acts on rabbit cells. Further since " both sheep and rabbit lysins occur which are neither dermo-necrotic nor lethal, the neutralisation of lysins can hardly be a reliable measure of the therapeutic value of anti-staphylococcus sera ".

VI. It is shown that the destruction of staphylococci, even in an immunized animal which recovers is a relatively slow process, the organisms being present in large numbers in the heart and particularly the kidneys after 5–7 days or more. Further, that occasionally staphylococci may continue to grow and spread in *e.g.* the marrow of the vertebrae, although the serum of the animal contains enough antibodies to protect a normal animal.

VII. Active immunity was induced (1) by injection of formalinized whole staphylococci, which produced agglutinins and opsonins but no antilysins, or (2) by formalinized filtrates of broth cultures which produced abundant antilysins. Immunity to a " killing dose " was produced by both methods, *i.e.* the absence or presence of antilysins was without significance. A " killing dose " in these and other experiments is described as that dose which kills control animals in 16–22 hours (occasionally up to 32 hours) and is equivalent to 3–4 minimum lethal doses.

The curves showing the resistance of the immunized animals show some variation. In general, however, an early increase in immunity occurred from about the 10th–17th day after vaccination; in some series it was absent. When it occurred it quickly decreased and was followed in all series by a rapid rise to complete protection about 2–3 months after vaccination. The immunity was not very high, but was sufficient to protect against 10 but not quite 20 " killing doses " (at least 30–40 M.L.D.). Whilst this immunity is dependent on serum antibodies which can be transferred passively, F. has been unable to identify them with other antibodies. Thus, no bacteriolytic or anticoagulase action could be detected, no antilysin could be detected in animals vaccinated with formalinized culture, and the opsonin curve ran a different course from the resistance curve. The protective sera possessed, however, the same anti-dermonecrotic antibodies though sometimes in very small quantity. Another protective factor appears to be located in the tissue.

VIII. Attention is given to non-specific factors in staphylococcus immunity. Blood (but not serum) from certain rabbits, and sera from certain sheep and horses, were shown to have a non-specific protective effect. In this and other papers reference is made to the probable non-specific protective effect of sera used for therapeutic purposes. It is nevertheless believed that certain immune sera made in sheep which contain anti-dermonecrotic substances and protect fully in small doses owe their protective effect to specific immune substances.

X. In this article the question of the distribution of staphylococci after injection, referred to in VI, is again taken up. Series of rabbits

were injected intravenously with one " killing dose " and killed at various intervals. Soon after injection (an hour or so) staphylococci were found in large numbers in the pulp cells of the spleen, in the Kupffer cells of the liver and in the bone marrow, *i.e.* in the main reticulo-endothelial centres. After 6–9 hours, only a few were found in these sites and the number became less as the infection progressed. If the animals were allowed to die, considerable numbers were, however, frequently found in these organs. It is suggested that this may be a result of distribution by the blood shortly before death or of proliferation afterwards. At no time were many staphylococci found in the lungs or musculature. The kidneys showed few during the first 12 hours, but generally showed a large number at death. The heart gave similar findings to the kidneys but with less regularity.

XI. F. reverts to discussion of the role of the lysin active against rabbit cells and its antilysin in human infection. He gives findings confirming earlier observations that staphylococcal filtrates are under all circumstances far less active against human blood corpuscles than rabbit corpuscles, though they may contain some lysin for human cells, a fact which accounts for the small amount of human antilysin sometimes present in antisera prepared with formalinized filtrates. Staphylococci which are pathogenic for both rabbits and human beings usually dissolve human red cells, but the amount of lysin for human cells is very small indeed and in F.'s experience its development in culture shows no parallelism with that of lysin for rabbit cells—in fact they are in his opinion different substances. He questions the value of the continued use of rabbit cells as a test, except for the reason that their sensitivity is fairly uniform. He also supports the view of those others who regard rabbit lysin and the dermonecrotic and lethal substances of staphylococci as different agents, and adduces in support of his view the observations made on human beings that a high or rising antilysin content (for rabbit cells) is often associated with lack of clinical improvement or even worsening of symptoms. Finally, he takes on these grounds strong exception to the action of the Health Organization of the League of Nations in making the rabbit antilysin content the basis of an estimation of the therapeutic value of sera intended for human use.—A. W. Stableforth.

Ramon, G., & Richou, R. (1940). Sur la transformation de la toxine staphylococcique en anatoxine. [**Transformation of Staphylococcal Toxin into Anatoxin**].—*Rev. Immunol.* **6.** 56–63. 7 tables. [6 refs.]

The authors have noted that there is a considerable loss in antigenic power of successive batches of anatoxin prepared from the toxins of staphylococci, notably those of Wood's strain.

The factors which govern the transformation of toxin into anatoxin (quantity of formol added, period and temperature of incubation) do not seem to be responsible for this change. On the other hand, the composition of the culture medium may be responsible since anatoxins from broth prepared from calf's liver are not as potent as those grown in synthetic media. It appears that the anatoxins from certain strains only of *Staphylococcus* exhibit this variation in antigenic potency.—S. J. Edwards.

Seastone, C. V. (1939). **Hemolytic Streptococcus Lymphadenitis in Guinea Pigs.**—*J. exp. Med.* **70.** 347–359. 4 tables. [17 refs.] [Author's summary copied *verbatim*].

A group of guinea pigs carrying a chronic streptococcus cervical lymphadenitis has been studied. The chronic disease may be transmitted with pure cultures of streptococci isolated from the naturally occurring abscesses. Its probable mode of transmission under natural conditions was shown to be the ingestion of the infective agent.

The spontaneous appearance of an acutely fatal variant was observed. Infection with the chronic strains protected animals against the highly virulent strain. Such immunity could not be passively transferred to either mice or guinea pigs, nor could any opsonizing, precipitating, or bactericidal antibody be associated with it. The presence of allergy could not be correlated with this immunity.

The dissociation of the chronic and acute strains was investigated and non-invasive phases isolated. No precipitin reaction attributable to an antigenic virulence factor could be demonstrated. No protection was obtained with vaccines or aggressins.

Seastone, C. V. (1939). **The Virulence of Group C Hemolytic Streptococci of Animal Origin.**—*J. exp. Med.* **70.** 361–378. 2 tables, 6 charts. [Numerous refs.] [Author's summary copied *verbatim*].

A non-antigenic mucoid polysaccharide similar to that described by Kendall, Heidelberger, and Dawson was isolated from group C hemolytic streptococci. A simple method for its quantitative estimation is described.

By means of this quantitative method, as well as by the direct isolation of the carbohydrates, the size and persistence of capsules in young cultures of various strains have been related to the non-antigenic mucoid polysaccharide.

Similarly, invasiveness in different strains has been related to the mucoid polysaccharide. Data indicating the non-haptene nature of this material are present.

An autolytic process, accelerated by bile, is involved in the loss of capsular material from young streptococci.

COWAN, J. A. (1940). **Epidemiology of Anthrax in North Dakota.**—*Amer. J. publ. Hlth.* **30.** 411–416. 1 table, 1 map. [10 refs.]

After reporting on four cases of anthrax in human beings, C. reviews the incidence of the disease in animals. Only 63 cases have been diagnosed since 1923. He suggests that a considerable number of cases probably occur in animals without being recognized, and states that insufficient evidence often exists to show the source of infection in man.—J. R. LAWSON.

ZOTTNER, G. (1940). Contribution au diagnostic bactérioscopique extemporané des affections charbonneuses. [**Rapid Bacterioscopic Diagnosis of Anthrax**].—*Maroc méd.* **20.** 63–64.

Z. describes a simple method of staining which clearly differentiates between *Bacillus anthracis* and putrefactive organisms. The technique is as follows :– fix for three minutes in a saturated solution of eosin in methyl-alcohol ; wash ; stain for 10–15 minutes in 5% Stevenels solution ; wash. Putrefactive organisms are stained a deep blue against a violet-blue background, and *B. anthracis* appears red or greenish red.—J. R. LAWSON.

HOLTH, H. (1939). En oversikt over de enkelte typer av tuberkelbaciller og deres påvisning i diagnostik öiemed. [**Types of Tubercle Bacilli and their Detection**]. —*Skand. VetTidskr.* **29.** 1125–1143. [English summary].

This is a general lecture on the diagnosis of TB. in domestic animals, with special reference to laboratory technique. The well known methods are discussed and a new cultural method is described. The medium consists of 90 c.c. of whole egg, 60 c.c. of potato filtrate, 3 c.c. of tuberculin and 5 c.c. of 5% lactic or hydrochloric acid. Very rapid growth of tubercle bacilli is obtained on this medium and colonies appear after 3–4 days' incubation. This medium is used to obtain quickly primary cultures which can then be differentiated on Petragnani's medium.

H. also refers to what he believes are genuine instances of transformation of human type bacilli into the bovine type and *vice versa*. —J. E.

LANGVAD-NIELSEN, E. (1940). Et Tilfaelde af Lungetuberkulose hos Hest foraarsaget af Typus avium. [**A Case of Avian Type Tuberculosis of the Lungs of a Horse**]. —*Maanedsskr. Dyrlaeg.* **51.** 546–553. [13 refs.]

An account of a case of diffuse "open" tuberculous broncho-pneumonia in a very old draught horse. G. pig inoculation with lung tissue suspension caused death in 26 days from generalized TB. and a rabbit died in 36 days from tuberculous emaciation. A slow growth of avian type tubercle bacilli was obtained on Löwenstein's medium from material from these animals, primary culture from the horse material having failed. The avian type culture was inoculated into two g. pigs and two rabbits in order to study the development of allergy ; the g. pigs reacted to bovine and to avian tuberculin (more intensely to the latter), but the rabbits reacted hardly at all.

Tests with bovine and avian tuberculin were carried out on 53 horses in the stable, from which the above horse came, and 31 reacted definitely to avian tuberculin, 8 to bovine tuberculin, 2 to both tuberculins equally, and 12 to neither. It appeared that the infection had been introduced into the stable by a horse bought in the previous year and that the infected horse referred to above had infected all the others.—J. E.

LILLEENGEN, K. (1939). Undersökningar på bacilltyperna vid svintuberkulos i Sverige. [**Types of Tubercle Bacilli in Porcine Tuberculosis in Sweden**].—*Skand. VetTidskr.* **29.** 1–12. 4 tables. [Numerous refs.] [English summary].

The type of infection was determined culturally and by animal inoculation for 128

cases of TB. in swine in Sweden. Of these, 107 were of the bovine type, 9 of the avian type, 8 of the human type, and 1 of mixed bovine and avian types. There is discussion of literature on the subject.—J. E.

DE MENDONÇA MACHADO, A. (1938). Investigaçoes bacteriológicas em dois casos de tuberculose em canídeos e em um ovino. **[Bacteriological Investigations of Tuberculosis in Two Dogs and a Sheep]**.—*Repos. Lab. Pat. vet., Lisboa.* **3.** 197–209. 5 tables. [11 refs.] [English and French summaries].

Caseous nodules containing human type tubercle bacilli were present in lymph nodes and viscera of a dog, destroyed because of suspected TB.

In another case, human type tubercle bacilli were found in the liver of a dog.

Bovine type tubercle bacilli were isolated from tuberculous lesions in a sheep.

A table is given showing the number of cases of TB. in sheep and goats detected at the municipal abattoir of Lisbon since 1885. The number is very small, the maximum for any one year being 14.—MILLER WATSON.

—. (1939). **Tuberculosis in Rural Areas.**—*Bull. Hlth Org. L. o. N.* **8.** 551–616. Numerous tables. [Numerous refs.]

This report consists of a close analysis of various papers on human TB. from all over Europe.

Part IV (pp. 600–604) is of veterinary interest as it deals with bovine type infection in man. Information is available from Scotland, France, U.S.A. and Holland. Thus 20% of 1,921 cases of human TB. in Scotland were found to be due to bovine type infection. In the Meurthe and Moselle department of France 20–30% of the cattle are believed to be tuberculous. A 1923 report from America stated that 15% of 80,000 cattle in Cattaraugus county (New York) were tuberculous. [This out-of-date quotation is to be regretted as it may be misleading. –Ed.]

Owing to the consumption of raw milk which is more widespread in rural districts, the bovine type of bacillus plays a very important part in the spread of the disease in rural areas, particularly in children.—D. L. HUGHES.

MEYER, K., & FROYEZ-ROEDERER. (1940). La fréquence des infections à bacilles bovins dans la tuberculose ostéo-articulaire et ganglionnaire. **[Frequency of Bovine Type Infection in Osteo-Arthritis and Lymph Node Tuberculosis in Man]**.—*Ann. Inst. Pasteur.* **64.** 167–172. [5 refs.]

Pus samples obtained by puncture or from fistulae in tuberculous osteo-arthritis and adenitis in man were cultured on Loewenstein's medium, with and without the addition of 2% glycerin, and the type of infection was determined by the growth characters after three weeks, followed by animal inoculation. Five of 235 cases of osteo-arthritis and 3 of 12 cases of adenitis were due to the bovine type of tubercle bacillus.—R. O. MUIR.

KIMURA, R., & KONDO, H. (1939). Ueber das seltene Vorkommen des bovinen Typus von Tuberkelbazillen bei Japanern. **[Rarity of Bovine Type Tuberculosis in the Japanese]**.—*Zbl. Bakt. I. (Orig.).* **144.** 365–369. 6 tables. [3 refs.] [Translation of authors' summary].

The authors isolated 160 strains of tubercle bacilli from Japanese patients and found no bovine strain amongst them. Investigations up to the present time into the types of tubercle bacilli in human TB. in Japan have resulted in only 13 cases of bovine type infection being discovered out of 1,823 cases investigated.

VAN DEINSE, F., & SOLOMIDÈS, J. (1939). Lésions rénales non spécifiques, causées chez le lapin par des bacilles tuberculeux de type bovin morts. **[Non-Specific Kidney Lesions in Rabbits caused by Dead Tubercle Bacilli of the Bovine Type]**.—*C. R. Soc. Biol. Paris.* **132.** 387–389. [1 ref.]

P.M. examination of 12 rabbits, which had been injected intravenously with 1–10 mg. of dead bovine tubercle bacilli and died after intervals of up to six months, revealed a state of cachexia with degeneration of the kidneys. Histological examination of the kidneys of every rabbit demonstrated that the lesions were non-specific and consisted of degeneration of the convoluted tubules, with or without glomerular or interstitial infiltration resulting in sclerosis. These lesions were attributed to toxic effects of the dead bacilli, comparable to the Yersin type of toxi-infection caused by intravenous injection of live avian bacilli.—R. O. MUIR.

VAN DEINSE, F., & SOLOMIDÈS, J. (1940). Recherches sur les effets toxiques des

bacilles tuberculeux bovins morts sur l'organisme du lapin. [**Toxic Effects of Dead Bovine Tubercle Bacilli in the Rabbit**].—*Ann. Inst. Pasteur.* **64.** 73–86. [Numerous refs.]

A critical review is given of the investigations of various authors as to the toxicity of the bovine type tubercle bacillus as distinct from its virulence. Experiments performed by the authors to demonstrate this toxic property are described. A series of 16 rabbits was injected intravenously with cultures of two strains of bovine tubercle bacilli, killed either by exposure to 70°C. for one hour or by storage for 2½–4 years in Besredka's liquid medium at room temperature. Repeated small doses or a single moderate dose of dead bacilli were injected. The clinical symptoms observed in the rabbits before death at varying intervals after injection are described, and there follows a lengthy discussion of the significance of the histopathological lesions at autopsy. The authors consider that the toxins from the dead bacilli introduced by the intravenous route rendered the animal organism allergic to them and thus produced non-specific lesions in various organs, especially in the kidneys, in the form of parenchymous degeneration and interstitial sclerosis.—R. O. Muir.

Feldman, W. H. (1939). **Intracutaneous Tuberculosis in Rabbits. Effects of Previous Injury on Lesions of the Primary and Secondary Type.**—*Amer. Rev. Tuberc.* **40.** 336–350. 12 figs. [4 refs.] [Author's summary copied *verbatim*].

The character of the local response to virulent bovine tubercle bacilli injected intracutaneously into rabbits was studied. Two groups of 10 rabbits each were utilised, one group not previously infected and one group sensitized by the subcutaneous injection previously of the same strain of tubercle bacilli used to make the subsequent intracutaneous inoculations. Tubercle bacilli were injected into the skin of three different regions of the back of each rabbit. Into one of these regions tuberculin had been injected forty-eight hours before the tubercle bacilli were introduced. Another of the regions was traumatized twenty-four hours before the infective agents were injected while the third region into which tubercle bacilli were injected was previously unaltered.

The lesions of the skin from one animal in each group were obtained for histopathological study at various intervals of time from one day up to forty-five days. It was found that (*1*) neither trauma nor the previous tuberculinization of a region influenced significantly the subsequent course of the resultant dermal reaction to tubercle bacilli as determined by a comparison of the local tissue alterations and cellular response; (*2*) the changes noted in the intracutaneous situations in the two groups of rabbits were essentially those one might expect in nonsensitized animals and in animals that were previously sensitized. In the first instance the process was that of primary infection; in the second the process was that which distinguishes the phenomenon of Koch.

Beck, A. (1938). **Bacillaemia in Experimental Tuberculosis.**—*Tubercle, Lond.* **19.** 398–402. 1 table. [Numerous refs.] [Author's summary copied *verbatim*].

(1) In eleven out of thirty-six tuberculous animals (thirty-four guinea-pigs, one rabbit, one cock) positive blood cultures were obtained using Löwenstein's technique. (2) The demonstrability of tuberculous bacillaemia by cultural methods in experimental tuberculosis depends *inter alia* on the type of bacillus, and probably also on its adaptation to artificial media. (3) Eleven human blood samples from pulmonary tuberculosis proved negative using the culture techniques of Löwenstein and Ninni-Bretey. Two out of twelve blood samples (ten from human pulmonary tuberculosis and two from tuberculous guinea-pigs), which were all negative in the culture experiment, proved positive by animal experiment.

Nasta, M., & Lupascu, I. (1939). Sur la transformation des bacilles tuberculeux humains et bovins de variété " R " en bacilles de variété " S " par passages successifs sur milieu de Loewenstein. [**Transformation of Human and Bovine R Type Tubercle Bacilli into S Type Bacilli by Successive Passages on Loewenstein's Medium**].—*C. R. Soc. Biol. Paris.* **132.** 587–589. [1 ref.]

Two bovine and three human strains of tubercle bacilli, which had been grown for several years on glycerin potato, and 13 recently isolated human strains were cultured on a liquid medium; the growth was rendered homogeneous by shaking with glass beads and then a series of passages was made at intervals of 15–20 days on Loewenstein's medium, the

pH of which is optimum for the growth of the " S " type of variant. Of the 18 strains, all of the " R " type, the five old strains changed to the " S " type after 1–5 passages, while only two of the recent strains were completely transformed to the " S " type, one after three passages and the other after nine. The transformation of these seven strains applied to their chemical constitution and antigenic structure as well as to their cultural appearance.—R. O. M.

Corper, H. J., Cohn, M. L., & Bower, C. (1940). **A Study of the Growth of Human Tubercle Bacilli on a Non-protein Synthetic Medium.**—*J. Lab. clin. Med.* **25.** 981–989. 4 figs., 3 tables. [8 refs.] [Authors' summary copied *verbatim*].

1. There is an optimum volume of nutrient medium (Wong-Weinzirl) required for the maximum growth of human tubercle bacilli (three months after planting) for a definite surface area.

2. Analysis of cultures of human tubercle bacilli in bottles of various sizes and surface areas with various volumes of nutrient medium (Wong-Weinzirl) showed that the glycerol consumption was a constant (about 5 Gm. being utilized per 100 c.c. medium) after maximum growth had been obtained. Comparatively smaller amounts of glucose were utilized, and the tuberculoprotein content, though variable, increased with the age of the culture.

3. Growth requirements for the human tubercle bacillus (heavily planted) are not great in a buffered neutral salt mixture (essentially Wong - Weinzirl medium without glycerol, glucose, or ammonium malate). As little as 1 per cent Wong-Weinzirl medium or 1 per cent glycerol added to the salt mixture will support the growth of human tubercle bacilli.

4. The tuberculoprotein present in the liquid medium is not appreciable in 500 c.c. volume of Wong-Weinzirl medium in 1 liter bottles until after maximum growth of human tubercle bacilli has been approached at about two to three months after planting. The liberation of tuberculoprotein into the liquid medium increases to a maximum with the aging of the bacillary mass up to from six to ten months, and probably is a product of autolysis of the bacilli.

I. Ballon, H. C., & Guernon, A. (1940). **The Effect of Sulfanilamide upon the Growth of Acid-Fast Bacilli *in vitro*.**—*Tubercle, Lond.* **21.** 153–160. 7 figs., 7 tables. [3 refs.]

II. Follis, R. H., Jr. (1940). **Sulfanilamide, Acetylsulfanilamide and Sulfapyridine. Their Effect on M. Tuberculosis Hominis in vitro.**—*Amer. Rev. Tuberc.* **41.** 117–119. 1 table. [9 refs.]

I. Concentrations of sulphanilamide of 1 : 1,000 entirely prevented growth, and of 1 : 2,500 allowed slight growth of a virulent strain of human tubercle bacilli on nutrient egg agar medium, with and without gentian violet in a 1 : 80,000 concentration. Similar results were obtained on Steenken and Smith's synthetic egg medium [*V. B.* **10.** 216]. Inhibition of growth of tubercle bacilli isolated from positive sputum occurred in a 1 : 7,500 concentration of sulphanilamide on nutrient egg agar, but the degree of inhibition was less on the synthetic egg medium. A 1 : 10,000 concentration of the drug was almost sufficient to prevent the growth of a bovine tubercle strain on both types of media and similar results were obtained for an avian strain. Growths of a culture of smegma bacilli were slight in a 1 : 10,000 concentration of sulphanilamide on both types of media, very slight at 1 : 5,000 and completely inhibited at 1 : 2,500 even after six weeks' incubation. Generally it is seen that sulphanilamide exerts an inhibitory effect upon the growth of acid-fast bacilli *in vitro* under specific conditions and in certain concentrations, but the results to date do not permit of clinical application.

II. Various concentrations of sulphanilamide, acetylsulphanilamide and sulphapyridine were added to 200 ml. portions of sterile Proskauer and Beck's synthetic medium; the flasks were sown with a human strain of tubercle bacilli. The first two drugs in concentration up to 0·1% exerted no appreciable bacteriostatic effect, but sulphapyridine in concentrations above 0·05% had a marked inhibitory effect upon growth. These results are in contrast with those of Ballon and Guernon (see I) who, however, employed a different medium.—Alfred Eden.

Mishulow, Lucy, & Reavin, Sadie. (1940). **Cultural Diagnosis of Tuberculosis using Bordet-Gengou and Löwenstein Media.**—*J. Lab. clin. Med.* **25.** 876–881. 2 tables. [11 refs.] [Authors' summary copied *verbatim*].

Cultural diagnosis of tuberculosis instead of

guinea pig inoculation has been employed in our laboratories for the past five and one-half years. Only those specimens were cultured that would ordinarily have to be injected into guinea pigs, that is, those that could not be diagnosed on smear examinations.

A total of 1,108 specimens of sputa, tissues, pleural fluids, pus, urines, and other pathological materials were cultured. Each specimen was examined by smear, and those that were negative were cultured on the Bordet-Gengou and Löwenstein media.

The largest percentage of positive results was obtained on culturing pleural fluids, spinal fluids, and pus—48·3 to 66·6 per cent. Tissues were positive in 24·7 per cent, sputa in 13·4 per cent, and urines in 16·9 per cent.

Positive cultures were obtained within two to three weeks, with an average of 17 to eighteen days. Occasionally a positive culture was obtained in nine to ten days, and in a few instances, where the growth was very scant, it was not detected until the culture was incubated for four to five weeks. If the cultures were negative after five to six weeks' incubation, no growth was obtained on longer incubation. We, therefore, made the period of incubation five to six weeks.

More positive cultures were obtained on the Bordet-Gengou than on the Löwenstein medium, but occasionally growth of tubercle bacilli was obtained on the Löwenstein medium when the Bordet-Gengou medium was negative or overgrown by contaminants.

STAUB, A. (1939). Sur la vaccination contre le rouget du porc. [**Vaccination against Swine Erysipelas**].—*C. R. Acad. Sci., Paris.* **208.** 775–776. [1 ref.]

To make the vaccine, agar was added in the proportion of 2 : 1,000 to an attenuated culture of *Erysipelothrix rhusiopathiae*, which was so avirulent that doses of 1 c.c. of a 24 hours' broth culture were harmless to the pigeon and 0·125 c.c. produced only a transient sickness in the mouse. Injections of 0·125 c.c. of this in the mouse and pigeon and of 0·25 c.c. in the rabbit produced a strong and lasting immunity. It is stated that highly successful results were obtained in swine, but no details of the experiments are given.—J. R. LAWSON.

COLLINS, D. H., & GOLDIE, W. (1940). **Observations on Polyarthritis and on Experimental *Erysipelothrix* Infection of Swine.**—*J. Path. Bact.* **50.** 323–353. 28 figs. on 6 plates, 6 tables. [Numerous refs.]

Investigations were carried out on seven pigs affected with a subacute or chronic, non-suppurative, proliferative arthritis and on two other pigs which contracted arthritis while under observation. Cultural, biological and serological examinations showed that two of these animals were infected with *E. rhusiopathiae*, and two others gave positive reactions to the agglutination tests. Repeated intravenous injections of *E. rhusiopathiae* in experimental swine were followed by an arthritis similar to that found under field conditions. Subcutaneous inoculations alone failed to infect, but in those cases where this was followed by intravenous injections, arthritis was induced. Polyarthritis developed in eight of the experimental swine. Some of these harboured viable organisms up to eight months after injection but many grossly affected joints were found to be sterile. The onset of the disease was always gradual, the maximum severity being attained 6–8 weeks after it had become manifest. At this stage the animals were severely crippled, stunted and emaciated, and showed swelling of the joints due to intra-articular effusion and inflammatory oedema. Pathological changes varied according to the stage of the disease, and all stages were seen, from inflammatory oedema and vascular engorgement of the synovial tissues, to those where there was less oedema and greater cellular proliferation with permanent effect on the joints. Dense foci of lymphocytes were a striking feature in many of the joints. Lesions were also found in the heart, liver and arteries. The regional lymph nodes were sometimes enlarged and an increase in the monocytes of the blood was found to be a significant feature. No skin lesions of swine erysipelas were observed. Comparisons were made between experimental and naturally occurring arthritis in swine, and between swine arthritis and rheumatoid arthritis in man.

—J. R. LAWSON.

WATTS, P. S. (1940). **Studies on *Erysipelothrix rhusiopathiae*.**—*J. Path. Bact.* **50.** 355–369. 11 tables. [15 refs.]

To ascertain whether the occasional failures in swine erysipelas serum therapy might be due to antigenic differences between strains of *E. rhusiopathiae*, W. carried out a study of 43 strains obtained from various parts of the world. Cultural characteristics showed the

strains to be biologically similar. Agglutination tests showed that they could be divided roughly into two groups, the large majority falling into one group and only five into the other; further tests, agglutination, agglutinin absorption and biological, confirmed this. No correlation between groups and virulence could be ascertained. Each group possessed a heat-stable specific antigen, and in addition each probably contained two heat-labile antigens, which were present in different proportions in the two groups. These latter antigens would appear to be the important ones with regard to resistance to infection, since sera of low potency containing antibodies to them protected mice against many lethal doses of an organism of the same group. Field trials with swine to demonstrate protection following vaccination gave negative results, and intradermal tests to test active immunization showed that formolized vaccine failed to protect pigs against a minimal infective dose.—J. R. LAWSON.

—. (1940). **Discussion on Salmonella Infections.** [Speakers:– SAVAGE, W., LOVELL, R., SCOTT, W. M., GORDON, R. F., ALSTON, J. M., SCHÜTZE, H., & ST. JOHN-BROOKS, R.]—*Proc. R. Soc. Med.* **33.** 357–370. [Numerous refs.]

SAVAGE paid particular attention to the varying pathological manifestationa of the members of the salmonella group. There are three types of manifestation, *viz.*, continued fever such as occurs in enteric fever, acute gastro-intestinal irritation as in outbreaks of food poisoning, and general infections of a septicaemic nature. These manifestations, even with the same organism, may not be the same in man and in animals. Broadly speaking it seems possible to associate the type of salmonella with certain hosts and certain forms of pathological activity in these hosts. For instance, *S. typhi-murium* has a wide range of hosts in mammals, birds and man, in man it causes gastro-enteritis, but in animals it gives rise to a general infection. Salmonella organisms may also be divided into three groups according to their degree of specialization. There are the unspecialized types such as *S. typhi-murium* which attack a wide range of hosts, the specialized types such as *S. abortus-equi*, *S. abortus-ovis*, *S. pullorum*, and *S. paratyphi* A and B, and the types on their way to specialization such as *S. enteriditis* (Dublin), a natural parasite of cattle which may affect man. In the control of salmonella infections it is necessary to have an accurate knowledge of the distribution in nature of the various types and their specialized pathological activities.

LOVELL further emphasized the importance of a knowledge of the natural hosts of salmonella in tracking down the source of infection in man and animals. Thus dogs and cats have recently been incriminated in the spread of human infection with these organisms. There appears to be an association in certain cases between virus infections and salmonella. Swine fever is a good example of this, and it may occur also in distemper of dogs and ferrets and in a virus disease of young silver foxes.

Owing to the relatively high proportion of latent infections with salmonella, serological tests for their detection are important. There are two main difficulties in the interpretation of salmonella agglutination tests, the complicated antigenic structure of the organisms and the presence of normal agglutinins. With sera artificially prepared the antigenic overlaps can be detected, but sera from cases of disease do not bring out these distinctions clearly and there is some degree of cross-reaction. The presence of normal agglutinins in animals renders diagnosis difficult unless the normal range and levels are known.

SCOTT gave an account of his work in isolating salmonella from healthy pigs at slaughter. The object of the investigation was to see if English pigs were as free from salmonella infection as previous work had suggested. Material was drawn from a bacon factory in the West of England and from another in East Anglia. The material consisted of mesenteric lymph nodes and spleens. The lymph nodes from ten batches of pigs were pooled and similarly the spleens. Out of 50 batches of pigs (500 pigs) from the West of England, 20 yielded salmonella. Assuming that only one pig in a batch was infected, 23 pigs were infected, as in three instances two salmonella types were recovered from a batch, giving a percentage of 4·6 as a minimum. Similar results were obtained from the East Anglian pigs.

GORDON described an outbreak of disease in ducklings due to *S. typhi-murium*. Out of a flock of 57,000 ducklings the total loss was 30%, with a daily mortality of over 1,000. An improvement in the hygiene on the affected premises resulted in a drop in the mortality rate to 3%. A search among the adult breeding stock for carriers of *S. typhi-murium* and *S. enteriditis* revealed 4·6% of reactors to the

agglutination test among 21,000 birds. This percentage did not decrease on subsequent testing. In more detailed work with over 100 birds, *S. typhi-murium* was recovered from the ovary of 50% of the reactor birds examined. Nevertheless, it was not possible to recover the organisms from eggs laid by these birds and their progeny were quite healthy and were negative when blood tested at the age of four months.

Among the points mentioned by subsequent speakers were the antigenic structure of some of the more recently discovered members of the group, and the establishment of International Salmonella Centres.—D. L. HUGHES.

LÜTJE. (1938–1939). Beobachtungen über die Häufigkeit des Vorkommens von Enteritisbakterien beim Schwein, zugleich ein Beitrag zum Kapitel der Fleischvergiftungen. **[On the Occurrence of Enteritis Bacteria in Pigs, with Reference to Meat Poisoning].** — *Dtsch. tierärztl. Wschr.* **46.** 798–800, 829–832, and **47.** 13–15. [Numerous refs.]

Out of 7,778 pigs examined over a period of 15 years at the Veterinary Research Institute at Stade, salmonella organisms were found in 235 (3%); 61 of these were affected with swine fever. The types of salmonella in the latter were:—*S. cholerae-suis* in 51 cases, *S. typhi-suis* var. *voldagsen* in 6, *S. typhi-murium* in 3 and *S. enteritidis* var. *dublin* in 1. In the group unaffected with S.F., *S. cholerae-suis* was found in 136 cases (13 of which were also infected with *Erysipelothrix rhusiopathiae*), *S. typhi-suis* var. *voldagsen* in 6, *S. typhi-murium* in 23, *S. enteritidis* var. *dublin* in 8, and *S. enteritidis* var. *danysz* in 1. Of those with S.F., 55 died and 6 were slaughtered; in the uninfected group 126 died and 48 were slaughtered.

Examination of 23 cases of meat poisoning revealed the presence of *S. enteritidis* var. *dublin* in 9 cases, *S. typhi-murium* in 6, *S. cholerae-suis* in 5, *S. enteritidis* var. *essen* in 2, and *S. enteritidis* var. *danysz* in 1. Paratyphoid in swine is not always characterized by intestinal disturbances; in all cases of acute and rapid disease the meat of pigs should be examined bacteriologically. The occurrence of meat poisoning depends on the amount of bacteria ingested, not on the strength of preformed toxin. The severity of the infection also depends on the type present, *S. typhi-murium* being the most dangerous.—V. CHLÁDEK.

JUNGHERR, E. (1940). **Paratyphoid Infections in Birds.**—*Vet. Med.* **35.** 112–116. 1 photograph.

The most frequent salmonella organism found in birds is *S. typhi-murium*, and the next in order of frequency is *S. anatum*. Paratyphoid infection in pigeons is almost exclusively caused by a variant type of *S. typhi-murium* (which has lost heat-stable, antigenic factor V). Flies and other insects act as mechanical carriers of infection, but rodents must always be considered as intermediaries between different hosts.

The public health importance of such organisms is discussed; birds known to act as natural reservoirs are an important source of human food products, infected eggs being a particularly likely source of infection. Control from human and animal standpoints is discussed. Thorough cooking of eggs is sufficient to prevent infection. Control of paratyphoid infections is discussed.—G. C. BRANDER.

BOIVIN, A. (1939). Sur les rapports qui existent entre la virulence et la structure antigénique des Salmonella. **[The Relationship Existing between the Virulence and the Antigenic Structure of Salmonellas].**—*C. R. Soc. Biol. Paris.* **132.** 370–374. [6 refs.]

Using mice, B. investigated the relationship between virulence in the salmonellas and their content of gluco-lipoid O antigen. Three strains of *S. typhi-murium* were used, *viz*, a strain of low virulence, and a strain of high virulence, both of which contained gluco-lipoid O antigen, and a rough strain devoid of gluco-lipoid O antigen. The gluco-lipoid antigen or "antigène complet" was obtained by a trichloracetic acid extract method.

The following conclusions are drawn:—(1) the presence of gluco-lipoid O antigen is necessary for the virulence of the organism, but differences in virulence between strains are not due to unequal amounts of this antigen in the strains, nor to variations in the chemical and biological properties of the antigens; (2) the gluco-lipoid O antigen present in smooth strains of *S. typhi-murium* has a definite immunizing effect against artificial infection in mice, this effect resulting equally well whether the antigen is obtained from a strain of low or high virulence.—D. L. HUGHES.

JOHNSON, E. P., & POLLARD, M. (1940). **Further Observations on an Organism**

in Turkeys whose Blood Serums Agglutinate Salmonella pullorum.—*J. infect. Dis.* **66.** 193–197. 3 tables. [11 refs.]

This paper draws attention to the significance of nonspecific agglutination reactions as complicating factors in the programme for the eradication of *S. pullorum* disease of poultry. The organism described here and previously referred to as P_1 [see *V. B.* **6.** 793, and **7.** 210.] is Gram positive, and its cultural characteristics resemble those of the genus *Lactobacillus*. It was shown to be responsible for the positive agglutination that occurred with the serum of certain turkeys when tests were made for *S.p.* infection which could not, however, be isolated from these birds.

Agglutination tests with hyperimmune serum from rabbits indicated that cross agglutination occurred between the organism P_1, *S.p.* and a known strain of *Lactobacillus casei*. The homologous titre of the antiserum for the unknown organism was only 1 : 100.

The sera of three healthy turkeys immunized with P_1 were shown to agglutinate P_1 as well as *S.p.* In certain cases the titre against *S.p.* was higher than the homologous titre.

Four healthy chickens were immunized with *L. casei* and their sera were tested against *S.p.* There was agglutination against *S.p.*, suggesting cross-immunity between *L. casei* and *S.p.* [The homologous titres of the chicken sera are not given.]

The necessity for the adjustment of the pH of the P_1 antigen to an optimum level (7·6) owing to its spontaneous clumping (agglutination), is mentioned.

On the basis of the experimental data the name *Lactobacillus meleagridis* is suggested for this organism from turkeys.

[The inoculation of lactobacilli into rabbits is said to be followed by the development of joint lesions. No such lesions seem to have been observed in the rabbits immunized with the living culture of the turkey organism. Whilst the authors' findings are interesting with regard to the classification of the organism, more information, and agglutinin absorption tests seem to be required.]—S. G. Iyer.

Reydellet. (1939). Prophylaxie des brucelloses. Préfecture des Hautes-Alpes. Direction des services vétérinaires. Melitococcie. [**Prophylaxis of Human and Animal Brucellosis in the Hautes-Alpes, France in 1937**].—*Arch. internat. Brucelloses.* **2.** No. 2, 39–43.

Statistics of the number of cases of human and any concurrent animal brucelloses are recorded for various communes in the Hautes-Alpes. Testing of animals in regions where most human and animal brucelloses occurred was either by allergic (2,756 cases) or agglutination (79 cases) tests. In eight communes all the animals were tested. The results showed that almost all the communes investigated contained infected animals. Even when animal abortion did not occur in areas affected with human brucellosis, the animal population was always proved to be more or less infected.

Six types of vaccine, both living and dead, were given free for use in large herds in certain districts. A comparison of results obtained was, however, impossible because of abortions produced by foot and mouth disease.

The campaign embraced old centres of disease hitherto ignored by the health services.
—C. V. Watkins.

Rowlands, W. T., & Harbour, H. E. (1940). **Some Observations on the Use of "Abortulin".**—*Vet. Rec.* **52.** 425–427. 1 table. [2 refs.]

From a commercial dairy herd with a high abortion rate, ten out of 31 cows inoculated with "abortulin" [composition unknown] aborted, two retained the placenta and only one calved normally. Since there was a steady spread of infection through the herd though all new reactors were inoculated with "abortulin", the treatment was abandoned. In a second smaller herd, one of two pregnant reactors inoculated with "abortulin" aborted, and *Brucella abortus* infection was established by g. pig inoculation. Material from three aborting cows in the first herd was found by cultural or biological methods to be infected with *Br. abortus*. Discussing these results, the authors conclude that it is impossible to obtain an accurate index of the value of "abortulin" by observation of the abortion rate in treated herds.—R. O. Muir.

—. (1938). **The Prevalence of Undulant Fever (Brucellosis) in the United States.**—*Publ. Hlth Rep., Wash.* **53.** 1195–1199. 1 fig., 2 tables. [4 refs.]

Since 1922, when an epidemic of undulant fever broke out in Phoenix, Arizona, the number of reported cases in the United States, has steadily increased, rising from 112 in 1927 to 2,497 in 1937. Tables are given showing the numbers of cases and deaths reported in the

various states from 1930–37. It is suggested that if all milk were efficiently pasteurized, brucellosis would exist only as an occupational disease.

CAMERON, H. S., HUGHES, E. H., & GREGORY, P. W. (1940). **Studies on Genetic Resistance in Swine to Brucella Infection. Preliminary Report.**—*Cornell Vet.* **30.** 218–222. 1 table. [7 refs.]

During experimental work at the Davis Experimental Station, University of California, two sows were encountered which after repeated oral administration of suspensions of virulent *Br. suis* failed to react to the agglutination test and apparently were not carriers of the organism. In addition a young boar [no information as to any exposure to infection] failed in repeated tests to show a blood titre greater than " incomplete " at a serum dilution of 1 : 50. It was deduced that the behaviour of the animals in these respects was due to inherited characters. A breeding programme was consequently carried out to determine whether or not a genetic resistance to porcine brucellosis would occur in their progeny. Thirty-three of the progeny resulting from the matings of the two sows and the boar were exposed to infection. The progeny were weaned at eight weeks and two weeks later infection was attempted by oral administration of a 5 c.c. suspension of *Br. suis*, containing approximately six billion organisms per c.c. Results were judged by the reactions to the agglutination test. A high proportion failed to develop positive agglutination reactions.

—F. T. BOYLE.

DAVOLI, R. (1939). Observazioni e ricerche sulla sostanze specifiche solubili del gen. Brucella. [**Research on Specific Soluble Substances of the Genus** *Brucella*].—*Boll. Ist. sieroter. Milano.* **18.** 57–65. 3 tables. [Numerous refs.] [Author's English summary copied *verbatim*].

By means of trichloracetic acid precipitation of brucella cells, a fraction is obtained which is free from nitrogenous constituents, and is possibly identical with the preparations of Bovin and Mesrobeanu in its containing some lipo-glucidic groups.

The extract is toxic for normal white mice, precipitates immune serum and elicits specific antibodies in the rabbit.

The alcohol precipitable fraction of this extract, while still reacting as antigen both in vivo and in vitro, has a much lower toxicity; only 18% of the reducing substances (after hydrolysis) are precipitated by alcohol. The results suggest that the toxic fraction of this extract may be not identical with its other antigenic fractions.

I. HUDDLESON, I. F. (1940). **Demonstration of a Capsule on** *Brucella* **Cells.**—*Proc. Soc. exp. Biol., N.Y.* **43.** 773.

II. HUDDLESON, I. F. (1940). **The Presence of a Capsule on Brucella Cells.**—*J. Amer. vet. med. Ass.* **96.** 708–709. 1 fig. [2 refs.]

[H. states that both the R and S forms show a capsule, but in II he states that cultures that have become completely dissociated do not show a capsule. No reference to I or to the apparent change of view is made in II.]

The demonstration of the capsule is done by a combined indian ink and staining method, to get contrast between the capsule and the body of the cell. The method is described in I, but in II certain modifications are used. The method is also stated to be suitable for the demonstration of capsules in other bacteria. The size of the brucella capsule is not affected by incubation with specific serum.—S. J. G.

MASON, J. H., & ROBINSON, E. M. (1938). **The Isolation of** *Cl. welchii*, **Type B, from Foals affected with Dysentery.**—*Onderstepoort J. vet. Sci.* **11.** 333–337. 1 table. [2 refs.]

A description is given of a fatal outbreak of dysentery in very young foals on a stud farm in the Cape Province. The farm was in a lamb dysentery area, but the disease had not been previously observed on the farm. Symptoms were noticed within 48 hours of birth, and death occurred within 24 hours of the first symptom.

From the contents of the small intestine an organism of the *Clostridium welchii* group was isolated. On typing, the organism was found to be *Cl. welchii*, Type B, the cause of lamb dysentery. The infection was apparently present in the foaling boxes, and a recommendation to allow foaling in the open was followed by a cessation of the disease.

SMITH, Louis DeS., & LINDSLEY, C. H. (1939). **Inhibition of Proteinases of Certain Clostridia by Serum.**—*J. Bact.* **38.** 221–229. 3 tables. [14 refs.]

Investigations into the proteolytic activity of culture filtrates of various spore-forming anaerobes showed that the proteinases of *Clostridium botulinum*, *Cl. sporogenes* and a

rough strain of *Cl. histolyticum* were inhibited by fresh normal rabbit serum, but the proteinases of *Cl. histolyticum*, *Cl. oedematis-maligni*, and *Cl. welchii* were not inhibited. The β globulin and albumin, especially the latter, were responsible for this inhibition. Immune serum specifically inhibited the proteinase of *Cl. histolyticum*.—R. Allcroft.

Kendall, A. I., & Chinn, H. (1938). **The Decomposition of Ascorbic Acid by Certain Bacteria. Studies in Bacterial Metabolism. CIX.**—*J. infect. Dis.* **62.** 330–336. 4 tables. [7 refs.]

Procedures for isolating ascorbic acid fermenting bacteria from stomach contents, faeces of babies and adults, and faeces of g. pigs are described: most numerous were members of the *mucosus capsulatus* and enterococcus groups. An ascorbic acid medium was inoculated with pure cultures of these bacteria and the extent to which these organisms decomposed ascorbic acid was determined by estimating the amount of the acid left in the medium at four-hourly intervals up to 24 hours' incubation, and thereafter at longer intervals up to 168 hours' incubation.

It was found that certain cultures of bacteria (a strain of *mucosus capsulatus*, of *Bacterium flexneri* and of *Bact. alkaligenes*) exhibited a "protective" action upon the autodecomposition of ascorbic acid, *i.e.* they actually retarded the auto-oxidation of the acid; but it was demonstrated that the "protective" culture had practically no effect on the decomposition of the acid by the actively fermenting culture.

Glucose was observed to have a definite sparing action on the fermentation of ascorbic acid by postponing the decomposition of the acid until the glucose was used up.

It appears that specific strains of bacteria, rather than bacterial "species" are able to ferment ascorbic acid, and the theory is put forward that the ascorbic acid fermenting strains may gain the ascendency in the alimentary tracts of certain persons who would therefore exhibit an ascorbic acid deficiency.

—R. Allcroft.

Winslow, C. E. A., & Walker, H. H. (1939). **The Earlier Phases of the Bacterial Culture Cycle.**—*Bact. Revs.* **3.** 147-186. 5 tables. [Numerous refs.]

A systematic review is made of the literature dealing with the study of the bacterial life-cycle, and significant data are given to illustrate essential points. The authors accept the validity of the analogy between a bacterial culture cycle and a multicellular organism. The essence of the first phase of the cycle is the adjustment of the inoculated cells to a new medium, and its course and length depend on the character of the cells and the nature of the medium. The phase of physiological youth begins when the initial phase of stationary or decreasing population ends upon completion of the adjustment process. This phase is characterized by active metabolism and rapid increase in mass, but initially with delayed cell division. Both the initial increase and peak of metabolic activity slightly precede initial increase and peak in cell size. Metabolic data are given concerning heat production, oxygen consumption, CO_2 production, acid formation and liberation of NH_3 and H_2S. Studies of variations in cell morphology in early bacterial cultures as well as in ratios between sizes, counts, and total mass made by different authors by various methods, including the use of the photo-electric densitometer, are reviewed.

An analysis is made of the markedly reduced resistance of actively metabolic cells of the early culture cycle to various harmful chemical and physical agents and of their low susceptibility to agglutination coupled with a low electrophoretic charge. There follows a discussion of the phase of logarithmic increase about the middle of which, at the stage of maximum cell multiplication, most of the other characteristics of youth are declining.

—R. O. Muir.

I. Bisset, K. A. (1939). **The Mode of Growth of Bacterial Colonies.**—*J. Path. Bact.* **48.** 427–435. 2 text figs., 11 figs. on 2 plates. [6 refs.]

II. Bisset, K. A. (1939). **The Structure and Mode of Growth of Bacterial Colonies Morphologically Intermediate Between R and S Forms.**—*Ibid.* **49.** 491–496. 3 text figs., 4 figs. on 1 plate. [3 refs.]

I. The formation of R and S forms of various bacteria was studied by observing growth under coverslips on the surface of semi-solid agar in watch-glasses. Strains of *Bacterium shigae*, *Bact. coli*, *Bacillus mycoides*, *Bacillus anthracis*, *Streptococcus haemolyticus*, *Str. viridans* and *Pasteurella pseudotuberculosis* were used. B. concludes that conditions of growth being the same, the variation in colony formation does not depend on any qualities inherent in the organisms which compose them,

other than their rigidity and their tendency to grow in chains or threads or to divide completely.

II. Intermediate colonial variants between R and S forms of dysentery bacilli, *Vibrio cholerae*, and *B. anthracis* were studied. They occurred most frequently in old laboratory cultures, being either stable or unstable, the latter type showing an endless series of morphological variations between the two extremes. B. states that, except for *V. cholerae*, this variation was entirely dependent upon the strength of the longitudinal attachment of the constituent bacilli to one another as opposed to the friction of the surface of the medium. In the case of *V. cholerae*, however, variation depended upon the length and not upon the rigidity of the organisms in the colony [see also *V. B.* **9.** 254].—Hugh N. Spears.

Werkman, C. H. (1939). **Bacterial Dissimilation of Carbohydrates.**—*Bact. Revs.* **3.** 187–227. 2 figs., 1 table. [Num. refs.]

Following an introductory discussion of the metabolism of the autotrophic bacteria, W. attempts to reconstruct the biochemical processes, occurring in the living bacterial cell, concerned with the dissimilation of carbohydrates, which is defined as the transformation of the substrate to yield energy to the organism, as distinct from those endothermic changes which characterize assimilation. An explanation is given of biological oxidation and the various enzymes involved, notably dehydrogenases and coenzymes. The mechanism of anaerobic dissimilation (fermentation) is discussed in detail and experimental evidence is given that the Embden-Meyerhof-Parnas theory of metabolism, applied to muscle and yeast, is also applicable to a wide variety of bacterial fermentations. Particular attention is paid to the dissimilation of pyruvic acid, which is regarded as a cardinal intermediary in cellular metabolism. Aerobic dissimilation is defined and various systems of respiration described with details of the functions of certain catalytic pigments, such as cytochrome and flavoprotein. Reduction and oxidation processes involving haemin compounds are stated to constitute principal respiration, while uptake of oxygen in the absence of haemin compounds is referred to as secondary respiration.—R. O. Muir.

I. Klieneberger, Emmy. (1939). **Studies on Pleuropneumonia-like Organisms: the L 4 Organism as the Cause of Woglom's "Pyogenic Virus".**—*J. Hyg., Camb.* **39.** 260–265. 2 figs. on 1 plate. [7 refs.]

II. Woglom, W. H., & Warren, J. (1939). **The Nature of a Pyogenic Filterable Agent in the White Rat.**—*Ibid.* 266–267. [6 refs.]

I. A pleuropneumonia-like organism was isolated from Woglom and Warren's [*V. B.* **8.** 576.] "pyogenic virus" pus from abscesses in rats, by culture on boiled blood + beef-heart infusion agar and by subcutaneous injection of rats. This and three similar strains of different origin proved to be filtrable through Berkefeld V filters and yielded the same granular type of colony. Suspensions of all four strains were agglutinated to a titre of 1 : 160 by immune rabbit sera prepared against each strain, but were not agglutinated by sera prepared against six other species of the pleuro-pneumonia group. The four strains were considered to be representatives of the L4 species of the group which occur naturally in rats. While these L4 strains constantly reproduced abscesses in passage rats, six other pleuropneumonia-like species, although they produced a small abscess in the first rat, were not transmissible to further rats.

II. An organism, encountered in a rat sarcoma and at first regarded as a virus because it passed a Berkefeld N filter and produced cytoplasmic inclusions, was cultured in beef-infusion broth enriched with 10% horse serum. A study of its morphology, serology and pathogenicity for rats showed that it was identical with the L4 strains isolated by Klieneberger [see I] from material sent to her by the authors. Reference is made to filtrable organisms recovered by Sabin [*V. B.* **10.** 582.] and by Findlay *et al.* [*V. B.* **10.** 27.] from the brains of experimental mice. These were similar to the rat strain but not closely related to it.

—R. O. Muir.

Flatla, J. L. (1939). Ringworm hos rev. [**Ringworm in the Fox**].—*Skand. Vet-Tidskr.* **29.** 735–780. 27 figs. [6 refs.] [English summary].

A detailed description of an investigation into ringworm in silver foxes in Norway. Transmission tests showed that it could be passed to horses, cattle, and pigs, which recovered spontaneously in a month or two and to silver foxes, polecats, and g. pigs which recovered in 5–6 weeks. The organism was cultivated on various media (excellent figures are given) and

was diagnosed as *Trichophyton gypseum asteroides*.

At the same time ringworm of cattle was investigated; the cases encountered were diagnosed as *T. faviforme album* infection. Similar results of experimental transmission were obtained as with the fox ringworm. Goats, however, resisted infection with both types.—J. E.

CARPANO, M. (1940). Sulla splenomegalia micotica. Interessante caso di splenite ifomicetica in un giovane agnello da " Asteroides splenicus ovis " N.S. **[Splenomegaly in a Lamb due to *Asteroides splenicus ovis* n.sp.].**—*Riv. milit. Med. vet., Roma.* **3.** 3–15. 4 figs. [15 refs.] [English summary].

The organism described was isolated from the spleen of a young lamb. It could not be grown in artificial culture and was not pathogenic to laboratory animals. C. considers that it is a new species.—E. MARTIN.

PALMEIRO, J. M. (1938). Blastomicoses do cobaia, pôrco e cão. **[Blastomycosis in a G. Pig, a Pig and in Dogs].**—*Repos. Lab. Pat. vet., Lisboa.* **3.** 259–263. 3 figs. [English and French summaries].

P. isolated *Saccharomyces niger* from pus from a g. pig affected with recurrent abscesses of the pharynx. The organisms were not pathogenic for experimental animals.

Whitish caseo-calcareous nodules resembling tuberculous lesions were found in the liver of a pig. No acid-fast bacilli were present, but *S. granulomatosis* was demonstrated.

In the faeces of dogs affected with acute gastro-intestinal disturbance and haemorrhagic diarrhoea, a *Saccharomyces* was demonstrated. —MILLER WATSON.

PALMEIRO, J. M. (1938). Breve notícia àcêrca da alguns casos de criptococcia em bovinos. **[Some Cases of Cryptococcus Infection in Bovines].**—*Repos. Lab. Pat. vet., Lisboa.* **3.** 241–243. [English and French summaries].

P. reports the finding of organisms with the cultural, staining, and morphological characters of *C. farciminosus* in lesions in the lungs and lymph nodes of bovines. The lesions were purulent and the pus was sticky and yellowish in colour.—MILLER WATSON.

PALMEIRO, J. M. (1938). Alguns casos de sacaromicose em coelhos. **[Saccharomycosis in Rabbits].**—*Repos. Lab. Pat. vet., Lisboa.* **3.** 245–247. 2 figs. [English and French summaries].

P. concludes that the organism responsible for the condition was *Saccharomyces guttulatus*, normally present in the stomach and intestine and only pathogenic under certain conditions. He describes the P.M. findings in affected rabbits. The lungs showed purulent foci and in one case they were reduced to a purulent mass filling the thoracic cavity. The liver was hypertrophied as were also the lymph nodes. The intestines showed generalized enteritis.

Before death, the animals had discharges from the eyes and nostrils and had abscesses on various parts of the body. The organism was demonstrated in the nasal and ocular discharges.—MILLER WATSON.

DISEASES CAUSED BY PROTOZOAN PARASITES

CORSON, J. F. (1939). **A Summary of the Work of the Research Scheme on *Trypanosoma rhodesiense* during the Years 1930 to 1938.**—*E. Afr. med. J.* **16.** 84–92.

Owing to shortage of funds the original scheme of research had to be very considerably reduced, and work was only carried out on the question of animal reservoirs of *T. rhodesiense* and the relationship between that trypanosome, *T. gambiense*, and *T. brucei*. Some observations were also made on the prophylactic action of germanin. The various findings reported in this summary have been previously reported in various articles by C. and have been recorded in the *Veterinary Bulletin*; the most important seems to be that *T. rhodesiense* can retain its infectivity for man after over four years' maintenance in sheep, goats, or small game.

—U. F. RICHARDSON.

PERLA, D. (1939). **Relation of Hypophysis to Spleen. III. Hypophysectomy and Resistance to *Trypanosoma lewisi*.**—*Proc. Soc. exp. Biol., N.Y.* **40.** 91–94. 1 table. [9 refs.]

Since removal of the hypophysis results in atrophy of splenic and lymphoid tissue, it was thought that it might alter the response to trypanosome infection. Hypophysectomy in

rats, inoculated with *T. lewisi* three weeks after the operation, resulted in a decrease in resistance, in that infection was more prolonged and more intense as judged by the number of organisms present at the peak period, but none of the animals died. The administration of alkaline extract of anterior lobe, which is rich in spleen-stimulating factor, restored the resistance to the normal level. Reproductive forms were not present in any of the groups of experimental rats after 8–10 days, and it would seem that hypophysectomy does not inhibit ablastin production, but acts by impairing the activity of trypanolysins.—U. F. RICHARDSON.

KLIGLER, I. J., OLITZKI, L., & KLIGLER, Helen. (1940). **The Antigenic Composition and Immunizing Properties of Trypanosomes.**—*J. Immunol.* **38.** 317–331. 9 tables. [9 refs.]

Dried trypanosomes of the species *T. evansi* and *T. lewisi* were extracted in absolute alcohol, ether and chloroform, thus extracting three lipoid substances. It was found that *T. evansi* contained significantly more ether extractable lipoids whilst *T. lewisi* contained twice as much residue, chiefly protein in nature. After the removal of the lipoids the residue was extracted with 75% alcohol, heated, and a protein substance designated as P_1 was separated. The residue from this treatment was again extracted and centrifuged and a further protein fraction P_2 was obtained. Both strains of trypanosome contained only a small fraction of P_2 which is the characteristic endotoxin of bacteria. The glucoside fraction was insignificant in both. None of the fractions when inoculated into rabbits produced the characteristic hyperglycaemia noted after the injection of similar bacterial products. All fractions produced a polynuclear leucocytosis, the fractions obtained from *T. evansi* being more effective. The typical leucopenic effect produced by the P_1 and P_2 fractions of certain gram negative bacteria was entirely absent. Hyperthermic effect was produced by the lipoid and protein fractions of both trypanosomes. None of the fractions appeared to have any toxic properties. The residue of *T. lewisi* possessed some immunizing properties, and the residue of *T. evansi* did not. Injection of whole dead trypanosomes (*T. evansi*) produced a partial and transient immunity shown only by a prolongation of the incubation and survival periods.

Treatment with Bayer 205 resulted in a more solid and durable immunity against reinfection with a homologous strain, this immunity being very variable. It is suggested that actual infection involves the administration of a larger amount of antigen, and that there may be modifications during infection resulting in a great variety of antigenic factors.

It is considered that the immunity response to trypanosomes is conditioned by the dominant lipoidal character of the cell, but lipoids act only as low grade antigens, and the resulting antibodies bear little, if any, relation to immunity. —U. F. RICHARDSON.

I. DANIEL, G. E. (1940). **Note on Cultivation of *Trichomonas foetus*.**—*J. Parasit.* **26.** 85.

II. AVERY, J. L., & GARLICK, G. G. (1940). **A Simple Medium for the Cultural Diagnosis of *Trichomonas foetus* Infection in Cattle.**—*Proc. helminth. Soc. Wash.* **7.** 27–29. 1 table.

I. A method is described of cultivation of *T. foetus* in a medium containing no thermolabile substance. Bacteria-free cultures can be maintained for indefinite periods on this autoclaved medium. Disadvantages of the method are that a flocculent precipitate may form after several days standing, and the initial rate of division and the maximum number of trichomonads per c.c. may be less than in unautoclaved media.

II. Comparative results of the cultivation of *T. foetus* on a Ringer's-egg-blood-serum medium and a simple egg-saline medium showed that the latter medium was more efficient than the former for diagnostic purposes, but was unsuitable for continuous cultivation of trichomonads. A combination of direct microscopic examinations of vaginal washings and of culture on the egg-saline medium gave the most accurate results.—M. L. BINGHAM.

BUSHNELL, L. D., & TWIEHAUS, M. J. (1940). **Trichomoniasis in Turkeys.**—*Vet. Med.* **35.** 103–105. 2 figs. [12 refs.]

There are indications that there are at least two forms of the parasite clearly differentiated by the region of the alimentary canal they infect, and by the age susceptibility of the host. The symptoms of either are those of an acute enteritis. White or yellowish nodules varying from one half to several millimetres in diameter may be seen P.M. in the mouth, oesophagus and crop. The crop lesions are most characteristic; the infected mucous glands may contain a semi-caseous material and are surrounded by a ring of exudate. These lesions may be so numerous

as to form a confluent mass of necrotic ulcers over the wall of the organ. Oedema may occur in the tissues surrounding the crop. The mucosa of the proventriculus may be necrotic. The gizzard is not involved. The lesions in the intestine are catarrhal and the caeca are frequently involved.

Preventive treatment which includes isolation, rotation of feeding grounds, provision of a clean water supply and strict sanitation, is most important. The addition of copper sulphate to make a 1 : 2,000 solution in the drinking water is also recommended. One condition which appears to be especially important is to remove all wet and decomposing bedding.

—J. A. GRIFFITHS.

STAFSETH, H. J., MACK, W., & RYFF, J. F (1940). **Pseudomonas Infection in Turkeys.**—*Poult. Sci.* **19.** 126–130. 1 table. [5 refs.]

The authors isolated a *Pseudomonas* from turkeys belonging to a very large flock, in which there was an outbreak of disease with a 50% morbidity and a low mortality rate. The organism is described in detail as it does not appear to be either *P. aeruginosa* or *P. jaegeri.*

Several artificial infection experiments were tried. It was not possible to infect chickens by mouth. Young broth cultures instilled into the conjunctival sac, nose, and mouth produced only a transitory malaise in adult turkeys. Two-week-old turkey poults were susceptible to infection by the mouth, 10 out of 12 succumbing to the organism. Mice, rabbits, g. pigs, and rats were also susceptible when inoculated intraperitoneally.

Symptoms in artificially infected birds appeared in from less than 24 hours and up to 14 days after infection. They included a general droopiness, diarrhoea, wobbly gait, and weakness, and, in one or two cases, torticollis with rhythmic sideways movements of the head. Keratitis was also observed in some cases. On P.M. examination the blood was dark, syrupy, and incompletely coagulated. Enteritis and haemorrhagic petechiae on the serous membranes were common. Yellowish or grey spots in the liver or occasionally green areas were observed. In one or two cases there were lesions containing greenish pus. The organisms could be isolated from widely differing sites.

The authors are uncertain as to the actual significance of the organism, and they suggest that there may be a predisposing cause for the infection, possibly vitamin A deficiency. The role of rodents as reservoirs of infection must be considered as mice were found to be highly susceptible.—D. L. HUGHES.

PALMEIRO, J. M. (1938). Notícia àcêrca da existência da Eimeria Avium em Portugal. **[Avian Coccidiosis in Portugal].**—*Repos. Lab. Pat. vet., Lisboa.* **3.** 255–258. 1 fig. [9 refs.] [English and French summaries].

Coccidia found in fowls are described and grouped as *Eimeria avium.* This is stated to be the first time avian coccidiosis has been reported in Portugal.—MILLER WATSON.

MAYHEW, R. L. (1937). **Studies on Coccidiosis. IX. Histopathology of the Caecal Type in the Chicken.**—*Trans. Amer. micr. Soc.* **56.** 431–446. 14 figs. [14 refs.] [For part VIII, see *V. B.* **5.** 707].

In this paper M. compares the normal histology of the caecum with that of the infected one. An account is given of the changes which lead up to haemorrhage. It is shown that in cases of heavy infection a considerable part of the caecum may become involved, but that the consequent changes gradually decrease and eventually do not occur towards its smaller region. By the fourth day after infection the entire mucosa and submucosa become congested, and as the organisms increase in size the individual cells of these layers are separated, with the result that the blood-vessels are ruptured. When this occurs the various stages of the organisms are ejected along with tissue cells into the caecal lumen. The identity of individual tissue-layers is lost. The new mixed contents of the caecum form the characteristic plug which may either be passed out with the faeces, or digested, or decomposed by bacterial action. When only slight haemorrhage occurs it is usually only the epithelium and small areas of the mucosa which are ruptured. This condition disappears, and the tissues become normal again on recovery of the bird. Some unusual cases are described in which the caecal plugs may be retained; other unusual results of the disease are the presence of strictures and adhesions. The results described in this paper lend support to M.'s previous observations that birds which have been severely affected by coccidiosis later show inferiority in weight and egg-production. Slightly affected birds appear to be normal in these respects.—C. H.-S.

Wälchli, F. (1940). Praktische Erfahrungen über Enteritis haemorrhagica coccidiosa. [**Coccidial Dysentery in Cattle**]. — *Schweiz. Arch. Tierheilk.* **82.** 7–12.

A general paper from the point of view of the practising veterinary surgeon. Symptoms and treatment are given.—A. L. Wilson.

Fulton, J. D. (1940). **The Course of *Plasmodium relictum* Infection in Canaries and the Treatment of Bird and Monkey Malaria with Synthetic Bases.**—*Ann. trop. Med. Parasit.* **34.** 53–66. 9 tables, 1 chart. [3 refs.]

The course of *P. relictum* infection in canaries is described. The incubation period in mosquito-infected birds was slightly longer than in those infected by blood inoculation, but the mortality was much greater in the former than in the latter. Data concerning the first appearance of gametocytes and the duration of the schizogony cycle are also included. The effect was tested of some aromatic amidine compounds and certain other simple drugs against *P. relictum* and *P. knowlesi* infections. F. found that 4 : 4′-diamidino stilbene and 4 : 4′-diamidino-1 : 5-diphenoxy pentane have a definite action against monkey malaria. In one monkey, treated with the stilbene derivative, parasites disappeared and failed to reappear even after splenectomy. This base was inactive against bird malaria, but the phenoxy-pentane derivative and 2-amino-5-diethylamino pentane both possessed anti-malarial properties in *P. relictum* infections.—M. L. Bingham.

Decourt, P., Schneider, J., & Kerrest-Grosdidier. (1939). Disparition du pouvoir infestant du sang pendant la phase descendante de l'infestation par *Plasmodium gallinaceum.* [**Disappearance of the Infective Power of the Blood during the Descending Phase of *P. gallinaceum* Infection**].—*C. R. Soc. Biol. Paris.* **131.** 1193–1195.

P. gallinaceum infection in fowls passes through several phases. During the first stage, lasting 4–5 days, the blood is not infective and parasites are not found in the peripheral circulation. Next, with the increasing number of parasites in the circulation, the blood becomes infective. After a peak period the descending phase begins in which, despite the presence of large numbers of parasites in the circulating blood, it is not infective. In the fourth phase the blood is again infective although the number of parasites is once more very reduced. Further work is being carried out to ascertain the factors involved in this phenomenon.—M. L. B.

I. Hegner, R., & Dobler, Marian. (1939). **Attempts to Obtain Passive Immunity in Avian Malaria with Blood Serum and Spleen.**—*Amer. J. Hyg.* Sect. C. **30.** 81–91. 4 figs. [7 refs.]

II. Causey, O. R. (1939). **The Effect of Splenectomy on the Course of Malarial Infection in Canaries.**—*Ibid.* 93–99. 4 tables. [9 refs.]

III. Manwell, R. D., & Goldstein, F. (1939). **Strain Immunity in Avian Malaria.**—*Ibid.* 115–122. 3 tables. [15 refs.]

IV. Wolfson, F. (1939). **Morphological Differences in *Plasmodium relictum* in Canaries and Ducks** (*Anas buschas domestica*).—*Ibid.* 123–124. 7 figs. [3 refs.]

I. Serum from birds acutely infected with *Pl. cathemerium* has some protective value [see *V. B.* **9.** 839].

The authors report the results of different experiments carried out to confer passive immunity upon canaries with (1) serum from acute cases, (2) spleen from acute cases, and (3) spleen from latent cases. Tests with serum were made after heating to 56°C., for half an hour and also after drying. Dried spleen tissue was used in two experiments and fresh spleen in one experiment; evidence of passive immunity was judged by parasite number, symptoms, pathology, and mortality after infection. The same strain of *Pl.c.*, was used in all the experiments. The protection conferred by the injection of serum or dry spleen from infected birds was only slight [see also *V. B.* **9.** 841].

In an experiment in which dried spleen tissue from latent cases was injected into three clean birds which were subsequently tested for immunity, the treated birds lived longer than the control birds, but the difference was not very significant.

II. The importance of spleen in malarial immunity in mammals is discussed.

The course of infection in splenectomized and non-splenectomized canaries injected with the blood of a canary with latent or active *Pl.c.*, or *Pl.r.* infection, was almost identical. Non-splenectomized canaries, however, resisted infection with infected duck's blood; this shows the importance of the spleen in defence against the parasite. C. considers that this may be due to the action of canary spleen in haemolysing

the heterologous blood cells and their parasites, rather than to the specific action on the malarial parasites. The removal of the spleen from latent cases resulted in relapses; splenectomy may, therefore, be of aid in detecting latent infections.

III. The immunological characteristics of six different strains of *Pl. circumflexum* are reported [see also *V. B.* **8.** 697, and **9.** 841]. The authors carried out cross-immunity tests with different strains of the parasite and with *Pl. rouxi*. The immunity in *Pl. circ.* is strain specific, rather than species specific, although all the strains used conferred partial protection toward others. The authors consider that the phenomenon of malarial immunity is apparently similar in birds, monkeys and man.

In the experiments relating to the mutual protection exhibited in cross-infections with *Pl. circumflexum*, and *Pl. rouxi*, the latter conferred considerable protection against subsequent infection with the former, although the degree of protection toward the different strains was not the same. The relationship between the immunity conferred and the virulence of the strain is discussed [see *V. B.* **10.** 501].

IV. It was previously observed by W. [*V. B.* **9.** 839.] that *Pl. cathemerium*, from canaries, when inoculated into ducks, showed morphological differences. In this study, it is shown that by a series of transfers of the matinal strain of *Pl.r.* [Wolfson (1937)] from duck to duck, it is possible to increase the infection in ducks. Microscopic examination of blood smears showed that the gametocytes of *Pl.r.* in the duck are elongate with a tendency to surround the nucleus of the host cell, instead of being round; the nucleus of the host cell, however, tends to be displaced as in the canary.

—S. G. Iyer.

Markov, A. A., & Kurchatov, V. I. (1940). Kalendar' osnovnykh meropriyatiĭ pri hemosporidiozakh (piroplazmoznykh zabolevaniyakh) sel'skokhozyaĭstvennykh zhivotnykh. **[A Time Schedule of Measures for the Control of Piroplasmosis of Domestic Animals]**.—*Sovyet. Vet.* No. 2–3. pp. 21–25.

A detailed plan of measures recommended for the control of piroplasmosis, françaiellosis, theilerisis and anaplasmosis in horses, cattle, and sheep. The schedule is classified according to seasons, latitudes, animals, and causative agents, and includes measures for the destruction of vectors and intermediate hosts, measures of pasture and stable hygiene, and directions for the preventive observation and treatment of susceptible animals.—E. Martin.

Kurchatov, V. I. (1940). Profilaktika piroplazmozov i protivokleshchevye meropriyatiya v kholodnoe vremya goda. **[Piroplasmosis Control and Destruction of Ticks in the Cold Season]**.—*Sovyet. Vet.* No. 1. pp. 30–32.

In the southern districts of Russia (Crimea, Azerbaijan), ticks live on domestic animals and may transmit piroplasmosis in the autumn and winter as well as in the spring and summer. Control measures should not, therefore, be limited to the warm seasons.

A list of the ticks involved is given and recommendations made for winter control measures.—E. Martin.

Kurchatov, V. I., & Sokolov, B. D. (1940). Epizootologiya gornykh pastbishch kryma (yaĭl) v svete profilaktiki piroplazmozov. **[Crimean Mountain Pastures in Relation to Prevention of Piroplasmosis]**.—*Sovyet. Vet.* No. 1. p. 35.

Cattle, sheep, and horses, grazed in summer on mountain pastures 900–1,400 metres above sea level, were examined at regular intervals for the presence or absence of blood parasites. Ticks collected from the animals included *Hyalomma marginatum*, *Rhipicephalus bursa*, *Dermacentor silvarum*, *Haemaphysalis punctata*, *Ixodes ricinus*, and occasionally *Boophilus calcaratus*. Animals transferred from the lowlands to the mountain pastures were heavily tick infested soon after arrival and contracted piroplasmosis. Horses and cattle which have been grazed on mountain pastures for some time, rarely contract clinical signs of piroplasmosis, but minor outbreaks occur among sheep in some years. It is recommended that animals should be driven up to the mountain grazing grounds early in the season, before the vector ticks specific to them appear in great numbers in the lowlands. Sheep must be kept under constant observation from the time when the mountain population of *R. bursa* appears (end of May), and be given prompt treatment.—E. Martin.

Okuntsov, I. V., & Pogorzhel'skaya, V. M. (1940). K voprosu o nalichii izmel'chennykh form pri nuttallioze loshadeĭ. **[The Presence of a Smaller Form of**

Babesia equi **in Equine Piroplasmosis**]. —*Sovyet. Vet.* No. 2–3. pp. 39–43.

The authors injected a two-year-old healthy mare with the sterile filtrate of serum of five horses in whose blood *B. equi* was present. On the 21st day after the injection *B. equi* and bilirubin were found in the blood of the mare, and the temperature rose slightly above normal. The blood picture remained normal. The authors consider that the forms of *B. equi* found in the blood of horses which have recovered from the disease may be smaller than the generally accepted minimum size of 0·5μ, and thus could have passed the filter which would have retained larger forms such as are observed during acute attacks.—E. MARTIN.

MARKOV, A. A., KURCHATOV, V. I., & ABUSALIMOV, N. S. (1940). O piroplazmoze sobak v Azerbaĭdzhane. [**Canine Piroplasmosis in Azerbeijan**].—*Sovyet. Vet.* No. 1. p. 34.

An account of *Babesia canis* infection in four dogs. *Rhipicephalus sanguineus* is the vector in Azerbaijan.—E. MARTIN.

CARMICHAEL, J. (1939). **Turning Sickness of Cattle and** *Trypanosoma theileri*.—*Parasitology*. **31.** 498–500. [5 refs.]

A case is recorded of a cow which died after exhibiting symptoms typical of "turning sickness", with cerebral haemorrhage involving the head of the caudate nucleus and extending into the corpus striatum. Sections of the cerebral cortex showed congestion of the capillaries with varying degrees of perivascular infiltration, whilst sections through the lesions showed rupture of the capillaries and masses of trypanosomes in various stages of development from the leishmanial and crithidial forms to mature parasites, mixed with monocytes, erythrocytes and a few polymorphs. Attention is drawn to a similar case recorded by CARPANO (1932), and the suggestion is made that *T. theileri*, like *T. cruzi*, multiplies in "fixed" tissue as a leishmanial form by binary fission. It is also suggested that the *Theileria* and trypanosomes, which have been found in the cerebral lesions of "turning sickness", may be secondary invaders.—U. F. RICHARDSON.

CARPANO, M. (1937). Su di un interessante caso di Theileriosi nel bisonte e considerazioni sulle diverse specie costituenti il genere *Theileria*. [**An Interesting Case of Theileriosis in a Bison and Considerations of the Genus** *Theileria*]. —*Riv. Parasit.* **1.** 309–323. 7 figs. on 2 plates. [Numerous refs.] [English, French and German summaries].

The female of a pair of American bison received from Canada two years before and kept in the Zoological Gardens of Cairo in an enclosure near other wild ruminants, suddenly sickened with symptoms including anorexia, salivation, dyspnoea and stupor and died after 3–4 days. Examination of the blood showed that about 90% of the red blood corpuscles contained *Theileria*. Other pathological findings were typical of theileriasis. C. contends that, in view of the fact that no other bison existed at the time, either in the Zoological Gardens of Cairo or in any part of Egypt, the infection must have been transmitted by vector ticks from the neighbouring wild ruminant enclosure in which deer and antelopes were kept. Hence, he argues that since the same *Theileria* can be naturally transmitted to wild and domestic animals of various genera and species, the belief—hitherto generally held—that there are various species of *Theileria* specific for certain susceptible animal species, can no longer be accepted. He believes that the known *Theileria* are merely variants of the species *T. parva*.—E. MARTIN.

KURCHATOV, V. I., & MARKHEVKA, B. S. (1940). Opyt bor'by s teĭleriozom v usloviyakh kolkhoza. [**Control of Theileriasis on a Collective Farm**].—*Sovyet. Vet.* No. 4. pp. 31–34. 3 figs., 3 graphs.

An account of the reduction of the incidence of theileriasis from 100–22% by means of the usual methods of tick control.—E. MARTIN.

ROZEBOOM, L. E., STILES, G. W., & MOE, L. H. (1940). **Anaplasmosis Transmission by** *Dermacentor andersoni* **Stiles.** —*J. Parasit.* **26.** 95–100. [15 refs.]

No hereditary transmission of *Anaplasma marginale* was demonstrated in eggs or larvae of *D. andersoni* which, as females, had fed on recovered or carrier animals; first generation nymphs and adults, the progeny of infected females, were also incapable of transmitting anaplasmosis.

The disease was transmitted by male *D. andersoni*. In one case a two-hour interval elapsed between the infective feed and transfer to a clean animal, in another experiment there was an interval of one day between the two feeds, and in a third case four males remained infective for 47 days. These results support those of other workers [*V. B.* **8.** 582].

—M. L. BINGHAM.

I. Rimpau, W., Schlossberger, H., & Kathe, J. (1938). Ueber Leptospirosen in Deutschland. [**Leptospirosis in Germany**].—*Zbl. Bakt. I.* (*Orig.*). **141.** 318–334. [Numerous refs.]

II. Schüffner, W. (1938). Zu dem Artikel "Ueber Leptospirosen in Deutschland von W. Rimpau, H. Schlossberger und J. Kathe. [**Comment on the Article of Rimpau, Schlossberger and Kathe on "Leptospirosis in Germany"**].—*Ibid.* **142.** 220–222.

III. Schlossberger, H. (1938). Bemerkungen zu den vorstehenden Ausführungen von Prof. Dr. W. Schüffner. [**Reply to Schuffner on "Leptospirosis in Germany"**].—*Ibid.* 223–224.

I. This paper is about human leptospirosis in Germany. In it the authors refer to *L. canicola* and give their opinion that it is merely a variant of *L. icterohaemorrhagiae*.

II. Schüffner contests the above statement and draws attention to various reports of a distinct dog species, which, while being difficult to differentiate from *L. icterohaemorrhagiae* serologically, yet differs from it epidemiologically. S. admits that further research is necessary to decide the problem.

III. Schlossberger, in reply, declines to admit that *L. canicola* is a distinct species, stating that Schüffner's epidemiological grounds are insufficient. [Many authors have now accepted *L. canicola* as a distinct species—see *V. B.* **10.** 21, 170, 334 and 504.—Ed.]—J. E.

Kligler, I. J., Hermoni, D., & Perek, M. (1938). **Studies on Fowl Spirochetosis. I.—Immunisation of Chickens with *Spir. gallinarum*. II.—Presence of Serologically Differentiated Types.**—*J. comp. Path.* **51.** 197–205 and 206–212. 10 tables. [16 refs.]

I. Subcutaneous inoculation of 5 c.c. of a formalinized vaccine, made from cultures of spirochaetes in a mixture of two parts Tyrode's solution and one part rabbit serum or in egg medium, produced an immunity lasting at least six months, although the results were somewhat irregular. The use of 0·5 c.c. immune serum, followed shortly afterwards by injection of 0·25 c.c. infected blood, also produced a very useful immunity. Spirochaetocidal antibodies appeared in the serum of vaccinated chickens when either method was used, but their progressive disappearance from the circulation did not indicate a loss of immunity.

II. In the course of the immunization experiments recorded in I the authors noticed that strains of spirochaetes derived from various sources were serologically distinct. One strain was obtained from an infected chicken, and others from ticks, and the serological relationship was studied by the agglutinating and spirochaetocidal action of strain-specific immune sera and by cross-infection tests. Four distinct strains were obtained from five different areas. Further cross-infection experiments on artificially immunized and recovered birds showed that the strains were antigenically specific and each produced a solid immunity against an infection with the homologous strain, but immunized chickens were still susceptible to infection with a heterologous strain.

—M. L. Bingham.

I. Wolf, A., Cowen, D., & Paige, Beryl H. (1939). **Toxoplasmic Encephalomyelitis. III. A New Case of Granulomatous Encephalomyelitis Due to a Protozoon.**—*Amer. J. Path.* **15.** 657–694. 27 figs. on 6 plates. [Numerous refs.]

II. Wolf, A., Cowen, D., & Paige, Beryl H. (1940). **Toxoplasmic Encephalomyelitis. IV. Experimental Transmission of the Infection to Animals from a Human Infant.**—*J. exp. Med.* **71.** 187–214. 5 text figs., 15 figs. on 5 plates, 1 table. [13 refs.]

I. Four previous cases of protozoan encephalomyelitis have been recorded, and had been previsionally ascribed to *Encephalitozoon* infection, though it was pointed out that they might be due to a toxoplasm, but that this could not be decided until a case became available for experiment. Toxoplasmosis has been recorded in dogs, rabbits, g. pigs, gondis (*Ctenodactylus gondi*), and various other small mammals, reptiles, and birds, and although the organisms have been given different specific names, a number of authors have pointed out that they may represent a single species capable of infecting many hosts. A case is now reported of an infant who became ill when three days old, and developed convulsive seizures, disturbances in respiration and symptoms of involvement of the spinal cord with subarachnoid "block" in the cervical region. The infant died at the age of 31 days. Autopsy revealed a widespread encephalomyelitis characterized by multiple focal areas of inflammation and necrosis, and disseminated miliary granulomas. A protozoan parasite was present, often

in great numbers, in the leptomeningeal exudates and in the granulomas and in lesions of the choroid and retina. In comparing the protozoa of this and of one of the previously recorded cases with *Encephalitozoon* infection and toxoplasmosis, it was suggested that morphological differences between *Toxoplasma* and *Encephalitozoon* are insufficient to distinguish between them in sections. Toxoplasms stain easily with all common stains, whilst *Encephalitozoon* only stains well with carbol fuchsin. The lesions of *Encephalitozoon* infection include central necrosis of the granulomas of the central nervous system, whilst this does not occur in toxoplasmosis, or in the recorded human cases. The diffuse inflammatory and necrotic lesions, occurring in these human cases, also occur in toxoplasmic infection of rabbits but not in *Encephalitozoon* infection.

II. The authors record the infection of rabbits and rats inoculated intracerebrally with material from the brain of the child referred to in I. From the infected rabbits, g. pigs, chickens and monkeys were also infected. The morphology of the organism as seen in experimental animals agreed with the described morphology of a toxoplasm, and the disease produced agreed with the description of experimental toxoplasmosis. Some of the inoculated animals failed to develop severe disease, though in cases in which they were slaughtered infection could be demonstrated. Some of the resistant animals also proved immune to inoculation with strains of animal toxoplasmosis.

This paper gives a very complete account of the morphology of toxoplasms and the lesions of experimental toxoplasmosis, and should be consulted by those interested in the subject. —U. F. Richardson.

DISEASES CAUSED BY VIRUSES

Christiansen, M. (1939). Forekomsten af Mund- og Klovesyge hos Vildtet. [**Foot and Mouth Disease in Wild Game Animals**].—*Maanedsskr. Dyrlaeg.* **51.** 385–400. 2 figs. [14 refs.]

A valuable review of the literature, from which it is concluded that wild deer can, but rarely do, contract F. & M. disease and that they are of practically no importance in the spread of the disease among domestic animals in Europe. C. also describes cases of gross overgrowth of hoof horn in deer, which may possibly be a sequel to F. & M. disease.—J. E.

Nakamura, J. (1939). **Complement-Fixation Reaction in Rinderpest. V. Distribution of Antigen in the Body of the Infected Calf.**—*Jap. J. vet. Sci.* **1.** 89–118. 13 tables, 1 chart. [16 refs.] [In Japanese: abst. from English summary]. [For part IV, see *V. B.* **8.** 639].

In continuation of previous experiments, the distribution of antigen in different tissues of infected calves was studied. An auto-reaction between infected lymph nodes and immune serum obtained from the same animal was shown to occur, but there was no auto-reaction between normal lymph node and serum from the same animal. Raw extracts of 36 different tissues from infected calves were tested for their reaction to serum from a calf hyper-immunized against lymph node of a normal calf. 15 of these tissues showed close serological relationship to lymph node. With rabbit serum, similarly prepared, stronger reactions were obtained. Boiled extracts of the same materials were tested with serum from hyper-immunized cattle. Specific reactions were obtained with 10 of these tissues, but none against the serum of calves immunized with normal lymph node. In an infected calf, the virus seems to have a strong affinity for mucous membrane of the digestive canal and the lymphatic system. These tissues give the strongest antigens in the complement-fixation reaction.—S. J. Gilbert.

Goryachev, G. A. (1939). Stepen' opasnosti kontaktnogo rasprostraneniya infektsionnoĭ anemii v khronicheskoĭ forme. [**Is Equine Infectious Anaemia Spread by Contact During the Chronic Stage of Infection?**].—*Sovyet. Vet.* No. 2. pp. 16–18.

Twelve horses at the chronic stage of E.I.A. were kept in a stable together with four healthy horses for three months and six days, but were isolated for the duration of acute relapses and their stalls disinfected. The four healthy horses did not contract the disease.—E. M.

Andrievskii, I. I. (1940). Aborty na pochve zabolevaniya kobyl infektsionnoĭ anemieĭ. [**Abortion in Mares Affected with**

Equine Infectious Anaemia].—*Sovyet. Vet.* No. 4. pp. 21–22.

The authors describe an outbreak of E.I.A. among 600 naturally and artificially inseminated mares. Numerous abortions occurred, especially during or immediately after the acute febrile stage of the disease. Some of the mares did not contract E.I.A., and these mares did not abort. *Salmonella abortus-equi* could not be demonstrated either by bacteriological or serological methods. It is concluded, therefore, that E.I.A. was the cause of the abortions.

—E. MARTIN.

SHIRLAW, J. F. (1940). **Equine Encephalomyelitis in India.**—*J. R. Army vet. Cps.* **11.** 40–54 and 75–89. [Num. refs.]

The existence of E.E. in India is confirmed. The disease which exists in three well-defined forms—cerebral, spinal, and mixed cerebrospinal—is more nearly comparable to the type described by MARCHAND and MOUSSU (1926).

Although there is little doubt that the disease has been present for many years in India, it was accorded little attention until 1933, when a severe outbreak occurred in cavalry horses at Multan. After transfer to Jullendur, a second severe outbreak occurred during the winter of 1935–36 among the horses of the same regiment. Although sporadic cases have been reported since, no further major epizootic has appeared.

In India the symptoms of E.E. vary widely in different animals. While the majority of animals show paraplegia, most do not progress beyond this stage. Occasionally, signs of involvement of the higher brain centres are apparent. In all cases there is pronounced inability to maintain balance. General symptoms include either retention of urine or incontinence, paraphimosis, oedema of the vulva, loss of sensation in the hind quarters, irregularity of the heart beat, fits of yawning, and occasionally haemoglobinuria. In all cases there is progressive atrophy of the loin muscles. In acute cases autopsy shows well marked petechiation of the central nervous system. The liver presents signs of icterus and parenchymatous degeneration. Kidney lesions are usually present and are practically diagnostic in subacute or chronic cases. A peculiar feature of Indian cases is the frequent presence of general arterial sclerosis. In no instance has it been possible to demonstrate cell inclusion bodies, but transmission experiments have proved the disease to be caused by a neurotropic virus.

The disease known as "Kumri" in India has been established as a subacute encephalomyelitis in which spinal symptoms predominate.—D. D. OGILVIE.

KING, L. S. (1940). **Studies on Eastern Equine Encephalomyelitis. IV. Infection in the Mouse with Fresh and Fixed Virus. V. Histopathology in the Mouse.**—*J. exp. Med.* **71.** 95–106 and 107–112. 8 figs. on 2 plates, 8 tables. [18 refs.] [For previous parts, see *V. B.* **10.** 250].

IV. The general features of infection of g. pigs with Eastern E.E. virus have been reported in earlier parts of the series. Comparable studies on mice are now described. Two strains of virus were used, one freshly isolated from a horse and the other modified by serial passages through pigeons.

As with g. pigs the fresh strain of virus in mice was infective in high dilutions by all routes of "peripheral injections"; fixed virus, however, possessed a much lower invasive power unless introduced by the intranasal or intraocular routes. Even when injected directly into the nerve fixed virus showed little tendency to invade the central nervous system.

Mice, 10–12 days old, were more susceptible to infection than adults. Intraperitoneal injection of fresh virus in high dilution was rapidly and regularly fatal to them. Adults gave irregular results. Fixed virus even in infant mice, however, was much less effective than comparable doses of the fresh type.

Brain trauma did not alter the effective titre of either type of virus. It may, however, shorten the incubation period of fresh virus.

V. As in g. pigs two types of histopathology can be distinguished in mice infected with Eastern E.E. virus. These represent inflammatory and degenerative reactions.

In mice a few days old, the primary change in the brain is inflammatory. Polymorphs can be observed in the tissue as early as 36 hours after peripheral injection of virus. They are generally widespread in 48 hours. In adult mice inflammatory changes are much less pronounced. Degeneration affecting intercellular tissue first and nerve cell bodies only subsequently is more frequently apparent. Such degeneration appears to be independent of any inflammatory reaction. In the ultimate stages of disease, complete necrosis of all nervous elements may occur. The type of degeneration described is characterized in its early stages by vacuolation and destruction of the nervous

tissue parenchyma. It is peculiar to mice. In g. pigs the nerve cells may disintegrate, but the intercellular tissue is not affected.

There is as yet no evidence concerning the site of the action of the virus.—D. D. OGILVIE.

SCHOENING, H. W. (1939). **Recent Developments in Equine Encephalomyelitis.**—*Vet. Med.* **34.** 84–89. 3 figs.

—. (1939). **Equine Encephalomyelitis as a Professional Question.**—*J. Amer. vet. med. Ass.* **94.** 223–224.

I. The author quotes the results of a questionnaire. 30,000 cases occurred in 1935 and 7,000 in 1936; in 1937 there were over 170,000 cases in 30 states, with a 25% mortality, and at the time of writing in 1939, there were over 100,000 cases with a 21% mortality. The greater part of this paper is a review of the present position in regard to known means of controlling the disease.

Mention is made of the possible occurrence of the disease among wild birds. Reference is made to the isolation of the virus from ring-necked pheasants by TYZZER *et al* (1938), and S. also refers to reports of a disease among wild ducks in Montana in an area where E.E. was prevalent. Although no virus of E.E. was recovered from ducks which died, S. considers that the pathological findings are suggestive of that disease.

The means of control recommended are protection against insects, particularly mosquitoes, and the use of chick embryo vaccine. Horses should be stabled at night in mosquito-proof stables and the value of fly nets, hoods and sprays is emphasized for defensive measures.

II. In this editorial article attention is directed to the misuse of the press and the radio in making exaggerated statements representing E.E. as a terrifying disease sweeping across the country. The value of preventive treatment by the use of the chick embryo vaccine is stressed. Much has yet to be determined in regard to the proper methods of controlling the disease.—J. A. GRIFFITHS.

LAKTIONOVA, A. I., KHAIT, B. S., & KUTOKOVA, K. S. (1940). Dlitel'nost' sokhraneniya virusa chumy v mokrosolenykh svinykh shkurakh. [**Preservation of Swine Fever Virus in Wet-Salted Pig Skins**].—*Sovyet. Vet.* No. 4. pp. 51–52.

Ten young pigs were infected with S.F., killed after eight days, and their hides wet-salted. Extracts were then prepared from pieces of the hides after various intervals (16-54 days) and injected into piglets. None of the test animals contracted the disease.—E. M.

QUIROGA, S., & SCHANG, P. J. (1937). Il metodo intradermico di Donatien e Lestoquard nella diagnosi della peste porcina. [**The Intradermal Test for Swine Fever**].—*Profilassi.* **10.** 213–217. [9 refs.] [German summary].

From the results obtained in numerous experiments undertaken to establish the diagnostic value of the intradermal test for S.F. as carried out by DONATIEN and LESTOQUARD, the authors concluded that positive reactions are obtainable only in the presence of *Salmonella cholerae-suis*, while the test is negative in infection with S.F. virus alone.—E. MARTIN.

I. DONATIEN, A., & LESTOQUARD, F. (1938). Les causes d'erreur dans l'intradermo-réaction de la peste porcine. [**Causes of Error in the Use of the Intradermal Test for Swine Fever**].—*Profilassi.* **11.** 168–170. [1 ref.] [In French]. [Also appeared in *Rev. Méd. vét., Toulouse.* **91.** 22–27. (1939)].

II. QUIROGA, S. S., & SCHANG, P. J. (1938). Sulla diagnosi della peste suina secondo il metodo di Donatien e Lestoquard. [**The Intradermal Test for the Diagnosis of Swine Fever**].—*Profilassi.* **11.** 170–172.

I. In claiming that the diagnostic value of the intradermal test for swine fever [*V. B.* **7.** 615.] has been amply confirmed both in France and in French North Africa, the authors attribute the negative results obtained by QUIROGA and SCHANG [see preceding abstract] partly to their failure, as revealed by their paper, to adhere strictly to the technique prescribed, and partly to the recent realization that there are certain sources of error in the use of the test. Chief among these sources are stated to be variations in the reactivity of the swine, requiring a careful selection of the test subjects; the tendency in the animals to lose their capacity to react after two tests; variations in the antigenic activity of the sera prepared, and the fact that S.F. virus gradually loses its antigenic properties when it is preserved for long periods of time in the laboratory and used in numerous passages.

II. In replying to the above communication the authors refute the implication that they did not adhere, except in one case, to the technique

prescribed, and maintain that the results obtained by them, indicating the non-specificity of the intradermal test for S.F. were correct.

I. Mesrobeanu, I. (1938). Culture du virus de la maladie d'Aujeszky dans la membrane chorio-allantoïdienne du poulet. [**Cultivation of the Virus of Aujeszky's Disease on the Chorio-Allantoic Membrane of the Hen's Egg**]. —*C. R. Soc. Biol. Paris.* **127.** 1183–1185. [1 ref.]

II. Badenski, G., & Bruckner, I. (1938). Essais de culture du virus de la pseudorage (virus d'Aujeszky) sur la membrane chorio-allantoide de l'embryon de poulet. [**Attempts to Grow the Virus of Aujeszky's Disease on the Chorio-Allantoic Membrane of Chick Embryos**]. —*Ibid.* **129.** 406–407.

III. Badenski, G., & Bruckner, I. (1938). Sur l'évolution du virus de la pseudorage sur la membrane chorio-allantoide de l'embryon de poulet. [**Growth of the Virus of Aujeszky's Disease on the Chorio-Allantoic Membrane of Chick Embryos**].—*Ibid.* 408–409. 1 table.

IV. Glover, R. E. (1939). **Cultivation of the Virus of Aujeszky's Disease on the Chorio-Allantoic Membrane of the Developing Egg.**—*Brit. J. exp. Path.* **20.** 150–158. 3 tables. [9 refs.]

I. M. passaged the virus of Aujeszky's disease on the chorio-allantoic membrane of hens' eggs. Areas of thickening which developed were scattered over the inoculated surface and resembled bacterial colonies on agar surface cultures, being raised, light grey in colour and visible after 1–2 days; these became confluent as a light grey covering of the whole surface. Stained smear preparations showed an inflammatory cellular reaction, in which the ectoderm, mesoderm and endoderm were all involved. Necrosis commenced at the centre of the lesion, the nuclei being first involved; these showed a fragmentation of the chromatin of an oxychromatic nature arranged inside the nuclear membrane. The lesions resembled those produced by herpes in neurone cells. After 2–4 days the ectoderm ulcerated and eventually ruptured.

II. The authors used the method of Burnet for inoculation of chick embryos, claiming a greater membrane reaction than by the technique of Woodruff and Goodpasture. Each embryo passage was made through 4–6 embryos and the inoculum was titrated in rabbits and white mice simultaneously after each passage. The virus was passaged six times in each of two trials and further passage then failed. There was a diminution of virulence after the third passage, and it was inferred that no actual multiplication of virus had occurred.

The changes in the ectoderm and mesoderm layers are described, the endoderm remaining unaffected. These changes suggest that the intense inflammatory reaction of the chorio-allantoic membrane attenuated and finally destroyed the virus.

III. To test whether multiplication of virus by passage through chick embryos actually occurred, the authors inoculated a number of chick embryos in a similar manner to that described in II, and made titration examinations of the membranes of two of these at varying intervals after incubation. The membranes were emulsified as in II and four decimal dilutions of the emulsions were then titrated in mice of 13–16 g. body weight by intracerebral inoculation in doses of 0·03 c.c. The results of 90 titrations are tabulated and show that after 14 hours' incubation the virus had diminished; after 26 hours the activity of the virus sharply increased (up to 100 times); after 48 hours there was a fall in activity which gradually became one-tenth of that of the initial inoculum at the sixth day of incubation. The authors conclude that serial passage of Aujeszky's virus on chick embryos should be possible if a shorter period between passages (24–36 hours) is used than in their previous experiments.

IV. G. describes experiments with a Hungarian strain of virus of Aujeszky's disease. Propagation of the virus upon the chorio-allantoic membrane of developing eggs by the method of Burnet was made through 55 passages to produce attenuation for active immunization purposes. These passages were started with rabbit brain tissue having an M.L.D. of 2 mg. for rabbits and 5 mg. for g. pigs. This tissue was ground up and suspended 1 : 100 in broth-saline and then lightly centrifuged for 10 min. Six eggs were inoculated with 0·2 c.c. of this suspension, two being examined after 1 day, 2 after 2 days and the others after the 3rd and 4th days respectively. After 48 hours the membrane became opaque and a few minute, whitish, nodules appeared. After three days there was a haemorrhagic reaction of the whole membrane. The embryo was dead and auto-

lysis had commenced after four days. A portion of two-day-old membrane was used for the serial passages. A table shows how a decline in virulence for g. pigs and mice allowed longer survival according to the number of membrane passages. Between the 20th and 25th passages test animals died without local pruritis or definite symptoms. Very slight lesions were produced.

G. shows that most of the tissues of the chick embryo were infective except liver tissue. He describes the histology of the infected membranes. From titration of the virus at regular five-passage intervals, he concludes that the serial passage had caused some mutation. Unlike other antiserum-virus mixtures, Aujeszky's virus remained infective for egg membrane although in a state of neutralization for test animal inoculation. If the antiserum was applied not less than 30 min. before the virus, no infection occurred.—C. V. WATKINS.

I. BAILLY, J. (1939). Rapport sur la maladie d'Aujeszky. [**Aujeszky's Disease**].—*Rep. 13th int. vet. Congr. 1938.* **1.** 459–466. [In French: English, German and Italian summaries. Discussion pp. 476–478 in French and German].

II. KÖVES, J. (1939). Ueber die Aujeszkysche Krankheit. [**Aujeszky's Disease**].—*Ibid.* 467–476. [In German: English, French and Italian summaries. Discussion pp. 476–478 in French and German].

I. Limiting his review to recent research on the virus, B. states that artificial infection succeeds most readily by intracerebral inoculation, which results in early death usually without pruritus. Transmission can also be effected by the intradermal, subcutaneous, and intramuscular routes, *via* the anterior chamber of the eye, by injection into the plantar cushion (in dogs) and by ingestion. Except for one positive claim by GERLACH and SCHWEINBURG [*V.B.* **7.** 599.] all workers have failed to effect transmission by bites of one animal to another.

The virus is not present in every part of the brain, and this accounts for many reported failures in diagnosis. In B.'s experience the pyramids of the medulla and the median lobe of the cerebellum are the most frequent sites of virus. It is a curiosity in Aujeszky's disease that death usually occurs at night.

The virus is ultrafiltrable and has a particle size of 20–30 mμ, and is infective in extremely high dilution; it resists the action of desiccation for a long time and remains alive for years in glycerin in cold storage.

II. K. deals with the epidemiology and susceptibility of domestic and laboratory animals of which all the common species are susceptible, horses being, in general, the least susceptible. Fowls and pigeons can be infected experimentally.

In the discussion GOETZE reported having diagnosed eight cases of Aujeszky's disease in cattle in the Hanover region. VECHIU described some experimental work in Rumania, where some outbreaks have been observed in piglets, but never in adult swine, which also resist experimental infection: MACEK and BAILLY spoke to the effect that the clinical picture was very unreliable as a basis for diagnosis of Aujeszky's disease.—J. E.

LEDFORS, G. E., & SEILER, W. E. (1938). **Rabies in Coyotes.**—*Milit. Surg.* **82.** 400–402. 1 fig. [6 refs.]

Reference is made to various animals, other than dogs, which act as carriers of rabies. Attention is drawn to the role of the coyote in transmitting the disease in the western United States, particularly in California, where the infection has persisted since the epidemic in 1910. In this state, during 1922–33, 24 coyotes were examined and proved positive for rabies at the State Department of Public Health.

I. SMITH, R. O. A., MCGUIRE, J. P., STEPHENS, E. D., & SUBEDAR, B. N. L. (1938). **The Treatment of Animals with Antirabic Vaccine.**—*Indian med. Gaz.* **73.** 736–739. 3 tables. [4 refs.] [Reprinted in *Indian vet. J.* **16.** 64–70. (1939)].

II. WEBSTER, W. J. (1939). **Anti-Rabic Vaccine for Animals.**—*Indian vet. J.* **16.** 61–63.

I. Of domestic animals susceptible to rabies, and capable of transmitting it freely, dogs deserve most consideration with regard to antirabic treatment.

Prophylactic treatment with the dead, carbolized, fixed virus vaccine may be carried out extensively without danger of producing "inapparent", or "recurrent" rabies after a subsequent infection.

The authors do not recommend treatment of dogs severely bitten on the head or neck. Strict segregation of animals under treatment is necessary. Mortality from rabies among dogs

treated after exposure is only a little over 2%. The treatment affords protection against the Indian strains of street virus for eight months or more.

The authors favourably compare their Kasauli vaccine with a proprietary vaccine which is said to contain 33% rabies brain and cord tissue in which the virus has been killed by chloroform.

II. W. claims that antirabic vaccination of animals raises their resistance to infection, but that it is not a sure preventive, whether given before or after infection. Vaccination of dogs bitten by rabid animals, followed by confinement for three months, and close observation for a further three months is advised. Kasauli vaccine, a 6% sheep brain carbolized vaccine, is recommended for use in India. Subcutaneous injections of seven daily doses of 5 c.c. per 30 lb. body weight and 10 c.c. for dogs over this weight, were found to give some measure of protection for six months. Revaccination in six months, and later at yearly intervals is advised. Other animals should be vaccinated in doses proportionate to their body weight.

—K. T. JOHN.

HEMPT, A. (1938). Ueber eine karbolisierte antirabische Aether-Vaccine und ihren Schutzwert bei Mensch und Tier. **[Immunizing Value of Antirabic Carbol-Ether Vaccine in Man and Animals]**.—*Behring.-Mitt.* **9**. 150–209. 7 tables. [Numerous refs.]

An account of H.'s work in Yugoslavia since 1921 on the production of antirabic vaccine for infected persons and on vaccines, preventive and curative, for domestic animals. The type of vaccine H. has concentrated upon is a 10% rabbit or sheep brain suspension, which is extracted at a low temperature with ether and killed and preserved in 1% phenol in saline. The ether extraction is done to eliminate unwanted constituents, this portion being thrown away. Tests on rabbits showed that this vaccine conferred, by a few doses only, a good immunity to experimental infection and that it retained its immunizing power for many months.

The vaccine has been widely used on domestic animals: thus 2,905 animals were vaccinated after infection and only 1·62% died of rabies. For preventive purposes 2,910 animals were vaccinated (by three successive daily doses) and only 0·34% later died of rabies. [Various types of vaccines and many reports from European and Indian workers are discussed in this article, which also serves as a record of the important work on rabies in Yugoslavia. See also *V. B.* **10**. 421.]—J. E.

BÉGUET, M., & HORRENBERGER, R. (1940). Résultats d'une enquête sur les incidents observés au cours de la vaccination antirabique par le vaccin phéniqué. **[Results of an Enquiry into Antirabies Immunization with Phenol Vaccine]**.—*Bull. Soc. Path. exot.* **33**. 230–232. [1 ref.]

From 1937–1938, systematic comparative trials of antirabies vaccination by phenol and desiccated vaccines were made at the Pasteur Institute, Algeria; they were discontinued because of several alarming results. An enquiry was then instituted about similar results with phenol vaccine at other antirabies institutes, and the causes thereof.

Of 260,000 treatments at 30 centres, 140,000 (total at 14 centres) included no abnormal results. Otherwise the chief symptom was syncope in certain cases, occurring during the later half of treatment and resembling anaphylactic shock. Serious cases were very similar at all centres (sudden onset, nervous headache, more or less complete respiratory and cardiac syncope, some vomiting, or incontinence of urine). Recovery was usually rapid, but one case of partial paralysis, lasting several days, and one fatality are recorded. Neither the exact composition of the vaccine nor its method of administration (certain precautions advised by some authorities) explained these variable incidents. All races in all countries were affected, the gravity of cases seeming to rest on individual susceptibilities. No safe technique to exclude these sequelae can yet be outlined. Until phenol vaccine is proved superior to desiccated vaccine, the authors suggest that these results appear to weigh against its choice.

—C. V. WATKINS.

JONNESCO, D. (1938). Étude de quatre souches de virus des rues isolées de cas pour lesquels le traitement antirabique a échoué. **[Study of Four Strains of Street Rabies Virus Isolated from Cases where Antirabic Treatment was Unsuccessful]**.—*Ann. Inst. Pasteur.* **61**. 527–535. 1 fig. [14 refs.]

When death occurs from rabies in spite of treatment, the severity of the bite, the part bitten, the method of treatment, and the nature

of the street virus are all factors which may have been important with regard to the failure to confer immunity. The rapidity with which street virus may be fixed runs parallel with its virulence. Four viruses were studied from cases in which death had occurred after anti-rabic treatment, and all became rapidly fixed with a pronounced adaptation for the central nervous system. When injected subcutaneously they were very pathogenic for mice. Intracerebral inoculations of emulsion in doses of 0·5 c.c. were pathogenic to rabbits in dilutions of 1 : 400,000–1 : 700,000. The period of incubation in man gives no indication of virulence. Negri bodies were absent when the incubation period in the rabbit became fixed at three days.—S. J. Gilbert.

Topacio, T., & Coronel, A. B. (1939). **Studies on Avian Pest.**—*Philipp. J. anim. Indust.* **6.** 467–476.

This is a progress report of the experiments carried out on Newcastle disease of fowls since 1931 [see also *V. B.* **10.** 27].

Some of the experiments deal with the saliva or contents of the crop as the site of the virus, and figures are given to show the M.L.D. and viability of such materials. The crop contents and the organs of dead birds remained infective for seven days after death.

Immunization against the disease by intra-cloacal inoculation of virulent material as carried out in infectious laryngotracheitis was unsuccessful, for it produced the disease. Placing the infected birds in darkness did not alter the course of infection. A variety of tissue vaccines treated with different chemicals was tried with negative results. The disinfecting value of slaked lime, " clenzal ", and caustic soda was tested and all were found effective.

Intracerebral inoculation of the virus into rabbits, g. pigs, rats, mice, ducks and kittens was tried. In rabbits the virus persisted for one passage. In ducks the disease was reproduced without difficulty and after several passages through ducks the virulence to fowls remained the same. Negative results were obtained with the other animals. [In Great Britain and other countries ducks have been found resistant to infection by contact or by inoculation under natural and experimental conditions. The negative findings obtained by the authors in their attempts to develop a suitable preventive treatment against this disease are not surprising ; they are in agreement with the findings of other workers in countries where the disease is endemic.]

—S. G. Iyer.

Smith, W., & Andrewes, C. H. (1938). **Serological Races of Influenza Virus.**—*Brit. J. exp. Path.* **19.** 293–314. 5 tables, 8 charts. [14 refs.]

By means of cross-neutralization tests in mice an antigenic analysis was made of 28 strains of influenza virus isolated from human cases. Of the many antigenic components entering into the constitution of the various strains, four appear to be of major significance and these occur in very different proportions in the different strains. These strains were classified on the basis of their content of the four major antigens and fell into three groups, highly specific, relatively non-specific, and intermediate strains. A strain of virus was shown to absorb from a heterologous serum only those antibodies corresponding to the antigenic components of the absorbed strain. Active immunization experiments with mice show that the protection afforded by vaccination with a single strain is most effective against the homologous virus, while the efficiency of a vaccine against a heterologous virus is largely dependent upon the closeness of antigenic relation between the strains concerned. By the use of ferrets, there was some suggestion that in animals with some basic immunity the response to vaccination may be less specific than in animals with no previous experience of influenza.

The value of these results is discussed in relation to problems of human vaccination.

—Alfred Eden.

Smadel, J. E., Rivers, T. M., & Pickels, E. G. (1939). **Estimation of the Purity of Preparations of Elementary Bodies of Vaccinia.**—*J. exp. Med.* **70.** 379–385. 1 table. [8 refs.] [Authors' summary copied *verbatim*].

A method of estimating the purity of preparations of elementary bodies of vaccinia is described. It depends on the comparison of the number of infective units of virus in a given material with the number of elementary bodies. The latter figure is estimated from the dry weight of the preparation by means of a calculated value for the weight of a single dehydrated elementary body.

Values for the ratio of infective units of vaccine virus to elementary bodies varied between 1 : 2·4 and 1 ; 9·2 in seven consecutive

experiments; the average was 1 : 4·2. These ratios indicate a high degree of purity of the preparation. Moreover, they indicate that a relatively high percentage of the elementary bodies in the preparations was infective.

McFarlane, A. S., Macfarlane, M. G., Amies, C. R., & Eagles, G. H. (1939). **A Physical and Chemical Examination of Vaccinia Virus.**—*Brit. J. exp. Path.* **20.** 485–501. 1 text fig., 2 figs. on 1 plate, 7 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

The degree of hydration of the particle in homogeneous suspensions of the elementary bodies of vaccinia virus has been measured by a partition method; the particle has large amounts of water associated with it in the form of an atmosphere which is not penetrated by sucrose and egg albumin.

Elementary bodies can be dried, extracted with ether or benzene and resuspended in an aqueous medium to the same degree of dispersity as the original homogeneous suspension without detectable loss in infectivity. The physical and chemical properties of the residual particle, which must be considered to be the virus, are described.

The virus contains lipoid material which can only be removed by alcohol, as well as protein, carbohydrate and nucleic acid. Its behaviour to mechanical, osmotic and chemical agents suggests that it has no superficial membrane, and the possible structural forces which could maintain the integrity of the particle are discussed.

Moriyama, H., & Ohashi, S. (1939). **The True Nature of Viruses.**—*J. Shanghai Sci. Inst.* **4.** 63–133. 11 figs., 14 tables. [Numerous refs.] [In English].

This article is a review of American, English and German work on viruses together with a description of the authors' own work. In some cases their results appear to differ from those of other workers. In this paper most attention is paid to the properties of the plant viruses, bacteriophage and vaccinia virus. Minute-body-forming lipoproteins which can be produced from animal cells and cultures of *Bacterium coli* by physical and chemical means are considered to have properties similar to those of vaccinia virus and bacteriophage respectively, except for lack of specific activity. The relationship between these two substances (vaccinia virus and bacteriophage) is considered to be the same as that between serum globulins and specific antibodies.

The properties of viruses and toxins are also compared. It is concluded that viruses are non-living autocatalytic agents and the possibility that they may occasionally arise spontaneously is suggested.

[A clearer conception of modern views on the nature of viruses can be obtained by the study of Northrop's work on enzymes (see *V. B.* **9.** 918.) and of that by McFarlane *et al.* (see preceding abstract) on the nature of vaccinia virus.]—John Francis.

PARASITES IN RELATION TO DISEASE (ARTHROPODS)

Lewis, E. A. (1939). **Observations on *Glossina fuscipleuris* and other Tsetses in the Oyani Valley, Kenya Colony.**—*Bull. ent. Res.* **30.** 345–358. 7 figs. on 2 plates, 2 tables, 1 map. [4 refs.]

Four species of *Glossina* occur in the Oyani valley, *G. pallidipes*, *G. fuscipleuris*, *G. brevipalpis*, and *G. palpalis*. Breeding places are confined to narrow belts of bush, but the range of dispersal covers most of the Oyani catchment area. With the advance of tsetse and consequent losses from cattle trypanosomiasis, the area has been practically abandoned. It seems clear that no single method of control, except complete destruction of the forests, can be employed in such a mixed fly-belt with any certainty of success. "Densification" of bush may be applicable to *G. pallidipes*, but it would be very difficult to create an efficient unbroken belt of dense forest across the valley, and in the process the infestation with *G. brevipalpis*, *G. fuscipleuris* and *G. palpalis* might be extended. While trapping is useful against *G. pallidipes*, it is less effective against *G. palpalis*, and has no practical value against *G. brevipalpis* or *G. fuscipleuris*. Hand-catching helps to reduce *G. palpalis* and *G. pallidipes*, but is of little use with *G. brevipalpis* unless bait cattle are used, and very little is known of its value against *G. fuscipleuris*.

The puparia of *G. fuscipleuris* have been found in places where *G. brevipalpis* and *G. pallidipes* occur, in dense thickets, heavily shaded and damp. Empty puparia shells gave

evidence of parasitization by the insects *Syntomosphyrum glossinae* (45% *G. brevipalpis* and 20% *G. fuscipleuris*) and by *Stomatoceras micans*. Parasites hatched out from puparia proved to be *Trichopria capensis*, var. *robustior*. Females of *Trichopria* were observed to attack puparia of *G. fuscipleuris* and *G. brevipalpis*. The adult fly is readily killed by exposure to direct sunlight.—J. A. GRIFFITHS.

NASH, T. A. M. (1939). **The Ecology of the Puparium of *Glossina* in Northern Nigeria.**—*Bull. ent. Res.* **30.** 259–284. 6 text figs., 6 figs. on 3 plates, 5 tables. [9 refs.]

The two species of *Glossina* which occur are *G. morsitans* and *G. tachnoides*, and the greatest number of adults are found during the rains. Five types of breeding places used are residual forest islands, small thickets, margins of river beds, logs, and seedling palms. *G. morsitans*, which is the hardier species, breeds in the rains under palm fronds and logs in the open woodland, but in the early dry season it removes to the small thickets and the more open parts of forest islands. At the beginning of the very hot season breeding is confined to the densest parts of the forest islands. In the early rains the position is reversed. *G. tachnoides*, during the dry season, breeds mainly in the river bed, and consequently all puparia are lost at the first flood of the rains; its major wet season breeding site is not yet known. In very wet years breeding of both species appears to cease for a month towards the end of the rains. Pupal mortality seems to be related to the absolute, not to the relative, water content of the soil. The pupal period may vary greatly in different breeding sites, but its short duration during the early rains, with a low pupal mortality and an equable climate for emerging offspring, must make this a favourable season for a rapid increase in the numbers of adult tsetse.—J. A. GRIFFITHS.

SPANN, J., & PEDRETTI, L. (1940). Dasselbekämpfungsversuche in Bayern 1939. **[Control of the Warble Fly in Bavaria in 1939].**—*Berl. Münch. tierärztl. Wschr.* Jan. 26th. 37–40. 2 figs.

In these experiments, 3% and 4% solutions of "derrophen" containing 6% rotenone were used. A single application of 4% solution was used, and the areas round the cysts were then gently massaged to stimulate larval activity and facilitate penetration of the solution into the cyst. Ten days later the cysts were examined, 89 being found empty. It was assumed that the massage and the irritation of the solution had caused the larvae to leave these cysts prematurely. In the remaining 1,810 cysts the solution had an efficiency of 89·4%.

Several other infested animals were washed twice with 3% solution, and then massaged, the efficiency in this case being 95·65%. In further experiments with the 3% solution, 0·25 c.c. was injected into each cyst, but massaging was omitted, the efficiency being 98%. None of these cysts was found to be empty.

Since the law compelling stock-owners to dress infested animals was passed in 1933, changes have occurred in the times of appearance of the larvae. The appearance of the first instar has been delayed from December until the beginning of March; that of the second from the end of December to the middle of March, and that of the third from the beginning of February to the latter half of April.

—A. L. WILSON.

MÜLLER, K. H. (1939). Zur Biologie der Taubenzecke Argas columbarum. **[Biology of *Argas columbarum* (= *A. reflexus*)].**—*Inaug. Diss., Berlin.* pp. 40. 9 figs., 3 tables. [Numerous refs.]

Descriptions are given of each stage of development together with observations on the anatomy and physiology of the adult ticks. M. also studied the life-cycle using pigeons as experimental hosts, the periods quoted being the shortest observed. The adults pair on the day after feeding; eggs are laid five days later, and require 36 days to hatch. Twenty-one days elapse before the larvae begin their first feed which lasts seven days; there is an interval of 71 days before the first moult. The first nymph feeds after 21 days and moults after 37 days more. The second nymph feeds after 21 days, and moults in a further 55 days. The third nymph feeds after 21 days, and 133 days elapse before the moult to the fourth nymph. The latter feeds after 21 days, and reaches the adult stage in another 190 days. The life-cycle thus takes at least 637 days to complete.

Heavy infestations caused great losses among the pigeons. M. calculated that after a meal of blood a male and female tick contain 0·192 and 0·315 c.c. of blood respectively. Since the blood content of a pigeon is from 10–18 c.c., according to size and age, and since ten imagoes will suck 3 c.c. of blood in a single meal,

the pigeons are liable to severe anaemia of the blood loss type.

Morphologically there is no difference between *A. columbarum* and *A. persicus*, but the former is distinguished by its long life-cycle and four nymphal stages.

The ticks would not feed when placed on either human or g. pig skin, although the species is known to bite human beings and monkeys. Control measures are also discussed. —A. L. Wilson.

Kurchatov, V. I. (1940). Puti izucheniya kleshcheĭ-perenoschikov v sootvetstvii s zadachami bor'by s piroplazmozami. **[The Study of Vector Ticks in Relation to the Control of Piroplasmosis]**.—*Sovyet. Vet.* No. 2–3. pp. 28–31.

About 30 species of ticks parasitic on domestic animals have been recorded in the U.S.S.R. The optimal concentration of arsenical dips varies considerably according to the habits of the tick and the conditions in which it lives; it is 0·16% for *Boophilus* and *Ixodes* and 0·24–0·26% for *Dermacentor*. Complications have been observed in sheep and horses dipped in concentrations of 0·18–0·19%. A circumstance to be given consideration is the possibility of the acclimatization and adaptation of ticks to new conditions in which they may be placed by accident.—E. Martin.

Dobychin, N. P. (1940). Izuchenie naibolee effektivnykh metodov diagnostiki chesotki domashnikh zhivotnykh. **[Diagnosis of Mange in Domestic Animals]**. —*Sovyet. Vet.* No. 4. pp. 35–37.

The authors use a 55% sugar solution or 60% sodium hyposulphite solution instead of Fülleborn's fluid for the flotation of mange mites, and claim that with these solutions a greater number of mites is concentrated on the surface of the liquid in a shorter time, thus facilitating diagnosis.—E. Martin.

PARASITES IN RELATION TO DISEASE (HELMINTHS)

Alicata, J. E. (1940). **The Life Cycle of *Postharmostomum gallinum*, the Cecal Fluke of Poultry.**—*J. Parasit.* **26.** 135–143. 15 figs. on 2 plates. [5 refs.]

A. had previously observed that land snails collected on a poultry farm were infested with the intermediate stage of *P. gallinum*. In this paper details are given on the development in the snail and in the final host.

The development of the sporocyst and cercariae takes place in the liver of the snail, usually within 60 days. The cercaria appears to leave the snail, and to re-enter the same or another snail through the renal opening, developing to the metacercaria in the pericardial cavity in about 25 days. A. discusses the possibility that two different snails may be necessary as intermediate hosts.

Experiments were made to trace development in the final host. Three chicks, 6–8 weeks old, were each fed, in two experiments, 50 snails (*Eulota similaris*), infected naturally with metacercariae and collected from a poultry farm where the fluke was known to occur. A month later the chicks were killed and the caeca found to be infested with *P. gallinum*.

A six-week-old chick was fed several sporocysts, containing apparently mature cercariae, isolated from a naturally infested snail. A month later, when this bird was killed and examined, no flukes were found in the caeca. This suggests that the cercarial stage is not infective to fowls.

Five snails, which had been experimentally exposed to cercariae 55 days earlier and were known to contain metacercariae were fed to a six-week-old chick. A month later, when this chick was killed and autopsied one adult fluke was found in the caecum.

Two eight-week-old chicks were each fed 50 snails of another species, *Subulina octona*, naturally infested with metacercariae believed to be those of *P. gallinum*. Adult *P. gallinum* were seen P.M. a month later in the caeca of these chicks.

From these experiments it will be seen that this fluke develops from the metacercaria to the adult in 24–28 days. All the control chicks remained free from helminths.—S. G. Iyer.

Pullar, E. M. (1939). **The Fox (*Vulpes vulpes* L. 1758) as a Definitive Host of *Taenia ovis* (Cobbold 1869) Ransom 1913.**—*Aust. vet. J.* **15.** 123–125. [6 refs.]

A preliminary survey in Victoria indicated that the fox was a not uncommon host of *T. ovis*. Reasons for the hypothesis that the fox is a natural host of the parasite are discussed.—H. McL. Gordon.

Pavlov, P. (1940). Le rôle de l'avitaminose, dans l'infestation du pigeon par le *Taenia*

echinococcus (les pigeons agés sont-ils susceptibles de servir d'hôte au parasite ?). [**Role of Avitaminosis in *Echinococcus* Infestation in Pigeons**].—*Bull. Soc. Path. exot.* **33.** 93–96. [6 refs.]

LEONARD (1896) reported the only known case of avian echinococcosis (of the liver of a turkey). Later investigations have shown that even carnivorous birds are refractory to both larval and adult stages of *Echinococcus*.

P. describes two experiments with pigeons aged 12–15 months, which were placed on a vitamin-free diet (oats boiled for half an hour) for 30 days. Five pigeons were fed 1 c.c. (about 400,000 scolices) of the contents of hydatid cysts from sheep, the pigeons being starved for 24 hours before and after the feed. Three pigeons died in 5, 8, and 9 days and contained respectively only 7, 4, and 2 evaginated scolices in their intestines. Two control pigeons and the remaining two specially fed pigeons were examined at four and seven weeks after the feed and found to carry no adult *E. granulosus*. Another four pigeons similarly prepared were tested by intraperitoneal injection of a similar dose of scolices, two pigeons on normal diet serving as controls. Two dieted pigeons died and were examined two and five weeks after dosage, and the others were killed and examined six and seven months after dosage, all with negative results.

It is concluded that the pigeon cannot serve as a host for adult *Echinococcus*, even in this state of avitaminosis.—C. V. WATKINS.

NOSIK, A. F. (1940). K epizootologi, diagnostoke i terapii ekhinokokkoza sobak. [**Epizootology, Diagnosis and Treatment of *Echinococcus* Infestation in Dogs**].—*Sovyet. Vet.* No. 4. pp. 37–40. 1 fig.

A description of known facts regarding the sources of invasion, diagnostic methods, means of sanitary control, and therapy of tapeworm infestation in dogs.—E. MARTIN.

CLAPHAM, Phyllis A. (1939). **On a Sex Difference in the Infection Rate of Birds with *Syngamus trachea*.**—*J. Helminth.* **17.** 192–194. [1 ref.]

Reference is made to the comment by WHITLOCK [*V. B.* **9.** 862.], that there appear to be sexual differences in the degree of infection in partridges with *S. trachea*. Thirty-two out of 34 birds examined for *S. trachea* at the Michigan State Farm were found to be females. He suggested that the probable cause was the lowered vitality of females as a result of the strain of egg-laying.

C. describes her findings after P.M. examination of nearly 1,000 partridges sent in from practically every English county. The percentage of infection of *S. trachea* in males and females was found to differ, females showing a definitely poorer resistance to infection. Experimental dosage of 36 8-day-old chicks (18 males and 18 females), demonstrated that the females succumbed more quickly than the males. Since all the females died before the males even began to show symptoms, C. states that her results did not support WHITLOCK's conclusion that the strain of egg-laying is an important factor.—G. C. BRANDER.

CLAPHAM, Phyllis A. (1939). **Three New Intermediary Vectors for *Syngamus trachea*.**—*J. Helminth.* **17.** 191–192. [2 refs.]

C. notes that recent observations have shown that the centipede, *Scolopendra* sp., the leather-jacket, *Tipula* sp., and the springtail, *Sminthurus viridis*, may all act as vectors of *Syngamus trachea*.

Examination of naturally infected land has shown all these arthropods to be present. It would seem that the springtail is a highly dangerous vector for game birds, as it is known that young partridge chicks consume an enormous number of these insects in the first fortnight of their lives.

All three arthropods are probably responsible for much loss to poultry farmers, owing to their prevalence on all rearing grounds.—G. C. B.

SHULTS, R. E. S., & KRASTIN, N. I. (1938). Terapiya metastrongilezov svineĭ. [**Treatment of Metastrongyles in Swine**].—*Trud. vsesoyuz. Inst. Helmintol.* **3.** 5–32. Numerous tables. [Numerous refs.] Moscow: Sel'khozgiz.

The authors investigated the possibility of treating metastrongyle infestations of swine by intratracheal iodine injections. They describe the technique which they evolved to surmount the difficulties hitherto encountered with this method.

Preliminary experiments were made with 360 pigs, and the treatment was applied by the authors to 1,500 affected animals, and by 70 other veterinarians to a further unspecified number.

As a preliminary, 72 lungs of swine were examined in order to ascertain the localization of the helminths. Frequency and degree of the

infestation were slightly greater in the right lung than in the left. The parasites were found mainly in the diaphragmatic lobe and their distribution within the bronchi of that lobe was found to be :– stem-bronchus 41·8%, dorsal branches 25·5%, lateral branches 21·4%, and ventral branches 11·3%. 75% of the parasites were found in the peripheral sections of the 3rd and 4th degree bronchi. 69·4% of the metastrongyles found were *M. salmi* and *M. elongatus*, and 30·6% were *M. pudentotectus*.

Tests made to ascertain the tolerance of pigs to intratracheal injections of a solution consisting of 1 g. iodine, 2 g. potassium iodide and 1·5 l. water showed that up to 0·5 c.c. per kg. live weight provoked no adverse reaction of any kind. The injections were made in the upper part of the trachea, the animal lying on its back on an inclined plane at an angle of 30–40°.

The efficacy of the treatment was judged by comparing the P.M. findings of helminths in treated and untreated animals kept under identical conditions and known from faecal examination to be infested with metastrongyles.

Several groups of animals on various farms were treated. It is stated that when two injections were given at intervals of four days, 33–50% of the treated animals were found on P.M. examination to be completely free from lungworms, while all untreated animals were infested. In the rest of the treated animals the degree of infestation was 71–89% less than in the controls.—E. Martin.

Bozicevich, J. (1938). **Studies on Trichinosis. XII. The Preparation and Use of an Improved Trichina Antigen.**—*Publ. Hlth Rep., Wash.* **53.** 2130–2138. 1 fig. [9 refs.]

B. used a modification of the Baermann apparatus for the recovery of trichina larvae from ground trichinous rat carcasses. The antigen was then prepared by extraction with a neutral 0·85% solution of sodium chloride, without the use of preservatives. It was sterilized fractionally by heat, and was found to show no loss of titre even when maintained in sunlight and at room temperature for six weeks.

By means of precipitin and intradermal tests, B. compared this saline-extracted antigen with those extracted by other workers, and claims that more accurate diagnoses were obtained.

He describes a method for measuring intradermal reactions on experimental animals by means of cellophane tracings which are afterwards measured with a planimeter.

The results are also described of a number of precipitin and intradermal tests on human cases of trichinosis. All of 44 patients gave positive reactions to both tests within 30 days after infestation, although only 38 had reacted positively to the first precipitin test. Only 22 of these patients gave positive intradermal reactions to a much stronger *Ascaris* antigen, thus suggesting that a species specificity exists, and that the belief of some workers that there is a group-reacting factor in nematode protein is erroneous.

Lichterman, A., & Kleeman, I. (1939). **Detection of Trichinella Infestation in Hogs by the Intradermal Test.**—*Amer. J. publ. Hlth.* **29.** 1098–1102. 2 tables. [14 refs.]

The authors studied the value and accuracy of Bachman's (1928) intradermal test in detecting trichina infection. A group of 211 one-year-old pigs, city-owned and garbage-fed, were used for this purpose. The antigen was prepared from the carcasses of albino rats which, after 24 hours' starvation, had been fed cheese containing about 100 trichina larvae per g. The carcasses were ground and then digested in artificial gastric juice. The apparatus and method of digestion, which are described, were similar to those of Bozicevich [see preceding abstract].

The results of standardization by means of artificially infested rats showed that the active principles of the antigen are contained in the supernatant eluted portion, and this was the portion used for the intradermal test. Out of the 211 pigs tested, errors in diagnosis amounted to less than 3%.

I. Hall, M. C. (1937). **Studies on Trichinosis. IV. The Role of the Garbage-Fed Hog in the Production of Human Trichinosis.**—*Publ. Hlth Rep., Wash.* **52.** 873–886. 1 fig. [9 refs.] [For previous parts, see *V. B.* **8.** 449].

II. Nolan, M. C., & Bozicevich, J. (1938). **Studies on Trichinosis. V. The Incidence of Trichinosis as Indicated by Post-mortem Examinations of 1,000 Diaphragms.**—*Ibid.* **53.** 652–673. 1 fig., 3 tables. [12 refs.]

III. Hall, M. C. (1938). **Studies on Trichinosis. VI. Epidemiological Aspects of Trichinosis in the United**

States as Indicated by an Examination of 1,000 Diaphragms for Trichinae.—*Ibid.* 1086–1105. 1 fig., 2 tables. [8 refs.]

IV. HALL, M. C. (1938). **Studies on Trichinosis. VII. The Past and Present Status of Trichinosis in the United States and the Indicated Control Measures.**—*Ibid.* 1472–1486. 1 table. [7 refs.]

I. The number of hogs slaughtered annually in the U.S.A. is between 30 and 40 millions, and the trimmings from these are generally used as food for swine. Since these trimmings frequently contain viable larvae they constitute a major source of infestation.

There is little or no evidence, either experimental or observational, to show that pigs eat rats to an extent that would account for the known incidence of swine trichinosis. BILLINGS (1880) reported that, out of 51 rats examined from a knacker's yard, 71·5% were infested with trichinae, yet 28 swine kept on the same premises and fed on grain and cooked meat remained free from infestation. Pigs may eat rats if their diet is very deficient in protein.

II. A continuation of the work already done by HALL and COLLINS [*V. B.* **8.** 449.] on the incidence of trichinosis in persons dead from other causes. An additional 700 diaphragms had been examined and the statistics refer to the results obtained from a total of 1,000 diaphragms. The largest number of specimens, 824, came from hospitals in Washington, D.C. A total of 174 positive cases were diagnosed. Dead larvae only were found in 80 cases, viable larvae in 60 cases, and the remaining 34 positive cases contained both living and dead larvae. Light infestations of ten larvae or less per g. of muscle predominated over heavier infestations, the largest group, 50% of the total, yielding from 1–10 larvae per g., while the next largest group, 31·6% of the total, yielded less than one larva per g.

III. An examination of human infestation from various epidemiological points of view. Incidence in the Teutonic and Latin races was found to be very high ; this is supported by the fact that these races are the chief consumers of "summer sausages," which are regarded as being largely responsible for the spread of human trichinosis. Information is still inadequate to associate any particular civilian occupation with high incidence, although persons associated with the handling of meat might be expected to show a high incidence.

The geographical incidence of human trichinosis in the U.S.A. is striking ; it is dependent on the incidence in swine used as food, which in turn is definitely correlated with the feeding methods. Garbage-fed hogs are most numerous along the north-eastern Atlantic coast and the southern part of the Pacific coast since the large cities in these areas provide an abundance of suitable material, whereas in the middle west garbage is not so abundant and swine are largely grain fed or pasture raised. The highest incidences of human trichinosis were recorded in the coastal areas, approximately one out of every four cadavers examined being positive. Low incidence in southern swine, less than 1%, is correlated with the lowest incidence found in human beings, 3·5% and 5% at New Orleans [there is no explanation of the double figure].

IV. Examination of the available data shows that the U.S.A. has a larger trichinosis problem than other countries, and that the human incidence has not been markedly lowered during the past 50 years. The incidence in swine has decreased only as the once widespread habit of feeding on offal from slaughtered hogs has decreased. This is not the result of a control campaign, but is due to improved general sanitary conditions.

H. suggests a national control programme for the whole of the U.S.A., in which the U.S. Public Health Service (concerned with human trichinosis) and the Federal Bureau of Animal Industry (concerned with swine trichinosis), would co-operate jointly with the state health departments and the state livestock sanitary boards respectively. A co-ordinated plan of objectives to be attained should be drawn up, and should include location of all garbage plants and piggeries where pork scraps are fed to pigs. A licensing system should be adopted for large existing garbage plants, and licences for new plants should be refused. Nation-wide meat inspection should be established, such inspection to be carried out by professional workers (about one-third of the country's meat is not subjected to professional inspection).

The elimination of pork scraps from the diet of pigs would result in the control of human trichinosis, and, furthermore, would cut down the number of outbreaks of hog cholera, and reduce the incidence of other swine diseases. The author believes that such a campaign could eliminate human trichinosis in five years.

—A. L. WILSON.

KRANEVELD, F. C. (1938). Stephanofilariosis in Niederländisch-Ostindien und ähnliche Infektionen in anderen Ländern. [**Stephanofilariasis in the Dutch East Indies and Similar Infections in other Countries**].—*Z. InfektKr. Haustiere.* **53.** 291–332. 42 figs., 1 table. [Num. refs.]

Detailed descriptions of the parasite, gross and microscopic pathology of the infestation in bovines and goats, and some notes on treatment are given. Experiments with several insects to ascertain whether any or all of them could act as vectors of the larvae were negative: the insects used were *Lyperosia exigua*, *Tabanus rubidus*, *Stomoxys calcitrans* and various species of *Armigeres*, *Aëdes* and *Culex*. Daily examinations of the blood of ten infected cattle for several months for evidence of microfilariae were also negative, except in one case, in which larvae were regularly found, which differed, however, from those in the lesions. In the blood of three other animals larvae were found once only.

In conclusion, K. points out the similarity between this stephanofilariasis and several conditions resembling it that have been reported in America, India and Malaya.—A. L. WILSON.

LANGE, H. (1938). Ueber eine durch Tropisurus fissispinus Diesing hervorgerufene Magenwurmseuche bei Enten, mit besonderer Berücksichtigung der Entwicklung des Parasiten auf Grund des pathologisch-anatomischen Befundes. [*T. fissispinus* **causing Parasitic Gastritis in Ducks**].—*Z. InfektKr. Haustiere.* **53.** 1–8.

The paper contains a description of the pathology of the infestation in young ducks. The animals examined were emaciated and the most important P.M. features were great thickening of the wall and enlargement of the proventriculus, and enlargement of the spleen.

Sections of the wall of the proventriculus revealed female parasites deeply embedded in the muscular coat and surrounded by a local eosinophilia, macrophages and giant cells. A series of sections was examined, and it was concluded that the males do not penetrate the mucosa, that the females lay their eggs in the deep layers of the mucosa, and that the larvae hatch there and after wandering about reach the lumen of the intestine and are passed out in the faeces.—A. L. WILSON.

IMMUNITY

LANGER, K. (1938). Ueber die intracutane Tuberkulinprobe beim Pferde unter Berücksichtigung des Blutbildes. [**Intradermal Tuberculin Test of Horses with Reference to Blood Picture**].—*Inaug. Diss., Hanover.* pp. 56. 4 figs., 1 table. [20 refs.]

Intradermal tuberculin tests on 40 horses, seven of which were affected with TB., showed the test to be reliable. The blood picture did not aid the diagnosis of TB. either on its own account or in conjunction with the tuberculin test.—J. E.

MORALES-OTERO, P., KOPPISCH, E., & GONZALEZ, L. M. (1939). **Histology of the Cutaneous Reaction in Guinea Pigs to Purified Brucella Protein.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 503–505. [2 refs.]

Purified brucella protein described in a previous paper [*V. B.* **9.** 38.] was tested on normal and sensitized g. pigs and the histopathology of the test is described. Five sensitized and five normal g. pigs were injected intradermally in the shaven skin of the abdomen with three different dilutions of which 0·1 c.c. contained 0·1, 0·01, and 0·005 mg. respectively. As a control the same animals were injected with a suspension of killed brucella organisms. A normal and a sensitized animal were killed at intervals of 6, 12, 24, 48, 72 and 96 hours and the sites excised and examined. In normal g. pigs the dead brucella organisms and brucella proteins provoked an immediate but mild inflammatory reaction with eosinophiles and neutrophiles and without oedema. In sensitized animals the local reaction was more violent, mainly neutrophilic and accompanied by marked oedema. Qualitatively, the changes provoked by brucella protein were similar to those induced by dead bacilli.—S. J. GILBERT.

SCHAEFER, W. (1939). Le séro-diagnostic de la tuberculose à bacilles bovins chez l'homme. [**Serological Diagnosis of Bovine Type Tuberculosis in Man**].—*C. R. Soc. Biol. Paris.* **131.** 909–911. [5 refs.]

Experiments were carried out to demonstrate the presence of a specific protein antibody in

bovine type TB. infection in man. Complement fixation tests were made of sera from human cases of bovine and human type TB. using lipoid, polysaccharide, and protein antigens. Two series of cross-dilutions were used—one with trypsin-digested antigen and one with undigested antigen—to ascertain whether the fixation power of the protein was due to the proteins themselves or to the polysaccharides which are always present in varying quantities. The protein antibody is not present unless the undigested protein fixes complement at a higher dilution than the digested. If the two solutions fix complement at the same dilution it is due to the polysaccharide bodies. Serum from human type infection reacted with the trypsin-digested protein antigen in slightly higher dilution than with undigested protein antigens of bacilli of both the human and bovine types. It therefore contained only polysaccharide antibodies. Serum from a case of bovine type infection reacted to these tests in a reverse manner, the non-digested bovine type protein antigen giving c.-f. in the higher dilution. Both types of sera also contained lipoid fractions.

The following antibody fractions were determined in sera from 22 human type infections :– protein nil, polysaccharide plus lipoid 7, lipoid only 10, and polysaccharide only 1. In sera from 18 bovine type infections, the determinations were :– human protein nil, bovine protein 8, polysaccharide 12, and lipoid 14 (out of only 14 tested). Thus only half these latter sera contained specific bovine protein antibody; the reactions occurred in very high dilutions ($1 : 10^4$–$1 : 10^5$) and therefore correspond to the great skin sensitivity of man to tuberculin proteins.—C. V. Watkins.

Dorofeev, K. A. (1940). Diagnostika brutselleza krupnogo skota sero-allergicheskim metodom. [**Diagnosis of Brucella Infection in Cattle by Agglutination and Allergic Tests**].—*Sovyet. Vet.* No. 4. pp. 25–26. 1 table.

Results are tabulated of 79,049 tests undertaken on 25,150 animals on 192 farms to compare the agglutination and intradermal tests.

There was considerable agreement, but in the case of young infected animals the aggln. test was much less sensitive (3·4% reactors) than the intradermal (15·1% reactors). No sensitization occurred from the repeated use of " abortin ".—E. Martin.

Todd, F. A., & Ranney, A. F. (1940). **Effects of Pasteurization Temperatures on Brucella abortus Agglutinins in Milk.** —*Vet. Bull. U.S. Army.* **34.** 31–37. 3 tables. [1 ref.]

During routine agglutination tests for brucella infection, it was found that in several cases the young animals gave positive reactions whereas the older animals were negative. In three of such herds the common factor appeared to be the feeding of pasteurized skim milk and in one case the agglutination titre of the milk was 1 : 50. When several series of milk samples from reactor cows were subjected to pasteurization temperature (143·5°F.) for 30 min. the agglutination titres remained unaltered. Samples, however, from infected cows of milk with high agglutination titres, when subjected to a temperature of 164°F. for 30 minutes, showed practically no agglutination.—F. T. B.

Ramon, G. (1940). La méthode de floculation et le dosage des toxines et anatoxines des bacilles diphtérique et tétanique et de certains germes anaérobies de la gangrène gazeuse. (Perfringens, Vibrio septique, oedematiens, histolytique). [**Method of Flocculation and Dosage of Diphtheria, Tetanus, and Gas Gangrene Toxins and Antitoxins**].—*Rev. Immunol.* **6.** 65–85. 5 tables. [16 refs.]

The authors give a short review of the methods employed in assessing the antigenic potency of the toxins and anatoxins of diphtheria and tetanus bacilli by the flocculation test. Recent research work has afforded the means of extending the usefulness of the method to the measurement of the activity of antigens of the gas gangrene organisms. The relative simplicity of estimating potency by the flocculation test enables the production of toxins and anatoxins of high immunizing value. —S. J. Edwards.

Taliaferro, W. H. (1940). **The Mechanism of Immunity to Metazoan Parasites.**— *Amer. J. trop. Med.* **20.** 169–182. [16 refs.]

Most of the paper is devoted to work on immunity to *Nippostrongylus* infestation of the rat, and an attempt is made to correlate the results with those observed for other metazoan parasites.

The immune reactions to *Nippostrongylus* have an antibody basis with secondary cellular co-operation, the parasite's secretions and

excretions acting as antigens, and stimulating the production of precipitins in the immune host. The antibody-antigen complex is highly toxic, and also stimulates an allergic reaction. The precipitins may immobilize the parasites. The eventual disposal of the parasites varies in that those immobilized in the skin and lungs are encased in nodules, whereas those in the intestine are simply expelled by the natural eliminative action of the bowel. These statements suggest that immunity to *N. muris* is largely humoral, but CHANDLER believes that there exists an additional local intestinal immunity which is independent of circulating or passively transferable antibodies.

T. states that the work done on the larval infestations of taenioid tapeworms furnishes the best evidence of antibody action in relation to any of the metazoan parasites. The immunity of rats to *Cysticercus fasciolaris* can be divided into an early immunity which prevents the larvae from developing to a recognizable stage in the liver, and a late immunity which results in the death of the larvae after they have formed recognizable cysts. CAMPBELL (1938) demonstrated two antibodies, one associated with early immunity and appearing within a week after infestation and another associated with late immunity and appearing several weeks after infestation.

Although little work has been done on the chemical nature of helminth antigens CAMPBELL has prepared from ascarids a highly purified polysaccharide, which is antigenic both *in vivo* and *in vitro*, and a similar substance from *Taenia taeniaeformis*.—A. L. WILSON.

MILES, A. A., MISRA, S. S., & IRWIN, J. O. (1938). **The Estimation of the Bactericidal Power of the Blood.**—*J. Hyg., Camb.* **38.** 732–749. 8 tables. [12 refs.]

These investigations were mainly concerned with finding statistically valid measurements of the killing power of defibrinated human blood for cultures of *Staphylococcus aureus*. For this, the survival rate of a measured inoculum of bacteria in a standard volume of blood was found to be a reliable quantitative measure of the bactericidal power of blood. The number of viable organisms was estimated by counts of colonies developing from measured volumes of the fluids dropped on to the surface of solid media, of which Fildes' agar was found most suitable. A statistical expression was developed for the standard error of the ratio of number of survivors to number of bacteria in the inoculum, and using this and the separate colony counts on the medium, closely conforming to a Poisson series, the standard error of the survival rate was obtained.

Reduction in the number of colonies growing from a sample of blood-bacteria mixture may occur as a result of aggregation either by the blood agglutinins or in the cytoplasm of the leucocytes that are phagocytic but not bactericidal. With relatively small numbers of organisms these factors are non-operative and the survival rate is a true reflection of the killing power of the blood. The immunological significance of the survival rate has not been investigated, but the ranges of values for healthy human beings differ significantly from those of sufferers from chronic staphylococcal infections. Moreover, by the present technique, real differences in the bactericidal powers of various blood samples can be determined, independently of inherent technical and sampling errors in such procedures.—A. EDEN.

BERG, W. N. (1938). **Statistical Basis of Errors in Immunity Tests.**—*Amer. Rev. Tuberc.* **37.** 259–263. 1 table. [4 refs.]

It is shown statistically that it is practically impossible to select two or more small groups of g. pigs, such as 20 in each group, so that the groups will have the same mean length of life. As commonly carried out the longevity-immunity test may be misleading and therefore worse than useless. In a series of blank tests on groups of 20, with sterile salt solution for " immunization " and sterile sugar solution for " infection ", the " immunized groups " will outlive their " controls " in one half of the tests and frequently by as much as six months, merely as a result of random variation in longevity. Tables based on Eaton's longevity data for the g. pig render such blank tests unnecessary, but the differences between mean lengths of life must be taken into account in judging the potency of an immunizing material. Assuming that " blank differences " range from 0–6 months, potency should not be assumed from one test unless the immunized group outlives its control by more than six months. If in five tests immunized groups outlive their controls in all cases, even by a small margin, the probability is that immunization has actually occurred. This becomes a practical certainty if it happens in ten tests.

Only male g. pigs should be used in virulence and immunity tests since their longevity is much greater. In a large population of five-

month-old g. pigs, each has an average expectation of an additional 42 months of life if male, but only of 24 months if female.—H. H. GREEN.

I. METALNIKOV, S. (1935). **The Role of the Nervous System and Conditioned Reflexes in Immunity.**—*XIIe Congr. int. Zool. Lisbonne, 1935.* **2.** 777–788. [13 refs.] [In English].

II. ZERNOFF, V. (1935). Sur le rôle des réflexes conditionnels dans l'immunité. [**The Role of Conditioned Reflexes in Immunity**].—*Ibid.* 789–792. [6 refs.] [In French].

I. Evidence is presented, both original and corroborative, which shows that true conditioned reflexes were obtained with regard to immunity reactions (local and general leucocytosis, and formation of specific antibodies). A typical experiment demonstrated that an increase in the production of antibodies occurred in conditioned rabbits. Daily intraperitoneal injections of heated cholera vibrios were preceded by tactile or thermal conditioning stimuli. Three weeks after the last injection when the agglutinin titre had fallen, a rise in titre again occurred when the animals were subjected to the external conditioning stimulus only; the agglutinin titre of the controls remained at about the same level.

The fact that a simple external stimulus can change the leucocyte picture of the blood, or increase the production of antibodies, clearly demonstrates the role of the nervous system in immunity reactions. It is suggested that the nervous system is able to act by the intermediary of certain factors such as induction, radiation or hormones.

II. The work of DIACONO (1933) on the role of conditioned reflexes on haemolysins was repeated. A g. pig received 14 daily subcutaneous injections of red corpuscles of a sheep; each injection was preceded by a tactile conditioning stimulus (scratching the ear for one minute). One month after the last injection a rise in the haemolysin titre of 36% was obtained by submitting the animal for six days to the external conditioned stimulus only. Another g. pig required a total of 51 injections preceded by the tactile conditioning stimulus before true conditioned reflexes in the formation of haemolysins were obtained.

It is pointed out that the factor of individuality plays a great part in these experiments: some individuals give conditioned reflexes after 15–20 applications of stimuli while others require 50–100 applications to produce the same result.—R. ALLCROFT.

DISEASES, GENERAL

VAN DER SCHAAF, A., & ROZA, M. (1940). Brucellosis en onchocerciasis in verband met een chronisch gewrichtelijden bij runderen. [**Brucellosis and Onchocercosis Combined with Chronic Arthritis in Cattle**].—*Ned.-ind. Bl. Diergeneesk.* **52.** 1–20. 1 fig., 1 table. [Numerous refs.] [English and German summaries].

The condition described occurs in zebu cattle of the Hissar-Ongole breed in Sumatra, and is known under the local name of "sakit sané". It is characterized by arthritis in the joints of the limbs and by abortion and sterility.

A detailed study was made of three cases which showed diffuse arthritis of the knee or hock joints. The sera of all three animals reacted positively to the agglutination and complement-fixation tests for brucellosis. In all cases both *Onchocerca bovis* and a brucella organism were present in the peri-articular inflammatory tissues. The brucella was not present in the synovial cavity of the affected joints; in cultural tests it was found to differ from the *abortus*, *melitensis*, and *suis* types. In dye media it behaved like *Br. melitensis*, but produced H_2S on the appropriate medium. In other respects it resembled more closely the *abortus* type.

The authors conclude that the strain is a new variety of *Br. abortus* and they consider that *Onchocerca* is a link between the two clinical manifestations of "sakit sané", *Onchocerca* apparently occurring in symbiosis with *Brucella*, as is sometimes the case in horses.—L. T.

EGER, W. (1937). Ueber Ostitis fibrosa und Epithelkörperchen im Tierexperiment. [**Osteitis Fibrosa and the Parathyroids in Animal Experimentation**].—*Beitr. path. Anat.* **100.** 19–41. 10 figs., 1 table. [Numerous refs.] [Abst. from abst. in *Amer. J. Cancer.* **36.** 619. Signed: Seaton SAILER].

In order to determine the relation of the parathyroid to disturbances of metabolism and to

bone changes, the author experimented by injecting young rats with a variety of substances including lead acetate, lead sub-acetate, thallium acetate, glucose, ammonium chloride and a combination of the latter two substances with and without ether anaesthesia. Controls were injected with aluminum acetate and phosphoric acid. One hundred and three animals in all were employed. To control further the effects of the metabolic changes on bone, the parathyroids were resected unilaterally in one series of controls, bilaterally in another, and transplanted in a third series. It was possible to produce bone changes simulating generalized osteitis fibrosa with chronic lead poisoning and these changes ran parallel with hypertrophy of the parathyroids. The author regards the hyperplasia of the parathyroids as secondary to a primary disturbance of metabolism induced by a lead injection.

The article is well illustrated and there is an extensive bibliography.

EBERBECK, E. (1940). Zur Pathologie der seuchenhaften Krankheiten der Atmungsorgane des Pferdes, insbesondere des sog. ansteckenden Katarrhs der Luftwege und der Druse, sowie ihrer sich unmittelbar anschliessenden und späten Folgeerscheinungen. [**Pathology of Infectious Diseases of the Respiratory Organs of the Horse, Especially the So-Called "Infectious Catarrh" of the Respiratory Tract and Strangles**].—*Z. Veterinärk.* **52.** 73–89. [9 refs.]

E. has carried out since 1936 an investigation into diseases of horses in the German army, by means of the histological examination of tissues of dead horses. His object was to learn more about obscure diseases of the nervous system and about certain respiratory infections and to study their interrelationship. The work was done at the Army Veterinary Investigation Office at Berlin.

In preliminary work in 1936 the brains of ten horses were examined, chronic internal hydrocephalus being diagnosed in nine. [No conclusions on the main problem were made at that time.] The tenth brain had been invaded by nematode larvae, which were also numerous in the retro-pharyngeal lymph nodes.

In 1937, 22 cases of hydrocephalus, 11 of neuritis, 5 of hydrocephalus with glomerulonephritis, and 6 of glomerulonephritis were diagnosed. The clinical histories of these cases varied greatly and included cases of apparent acute encephalitis, *Dummkoller*, and many forms of disordered nerve function. Some horses were merely vicious, and others had died suddenly. [The original should be seen for particulars.]

In 1938, attention was paid to attempts to correlate cases similar to the above with strangles; animals diagnosed as affected with strangles and at the same time showing symptoms of brain involvement were examined. In seven horses there was purulent meningitis, in two purpura with hepatic focal necrosis, and in 21 chronic cases nephritis, hepatitis, myocarditis or amyloidosis were the common findings. A further 110 cases are classified in groups :– 38 cases of bacterial, chiefly streptococcal infections, and 80 cases considered due to toxin action, the latter showing signs of chronic inflammation of one or more internal organs or nerve trunks. The acute cases were chiefly diagnosed as strangles or infectious respiratory catarrh (assumed to be identical with infectious bronchitis — Hoppegarten cough, *grippe* — as used by LECLAINCHE—and *skalma*), but the true original cause of the chronic cases could not be determined. E. considers that they were due to a primary strangles or respiratory catarrh and that these infections or secondary infections set up a chronic intoxication which acts on the blood vascular system of the whole body, causing damage to the capillaries; this upsets the blood supply regulatory function leading to organ changes. The latter are most evident in the kidneys, heart, and nervous tissue. [This pathological situation is the same as that postulated in connexion with osteodystrophia by MITCHELL (*V. B.* **6.** 444.), who, however, suggested that the capillary damage was due to avitaminosis. It is probable that both E. and Mitchell are correct].

The work of HOLZ and others [*V. B.* **9.** 769.] on nervous system lesions in equine infectious anaemia is discussed. E. believes that such lesions as ependymitis granularis, which Holz observed in horses with E.I.A., are not specific for the latter, but are rather a complication of an earlier attack of strangles or respiratory catarrh in horses later attacked by E.I.A.—J. E.

JEŽIĆ, J., & THALER, L. (1939). Jedna laboratorijska epidemija neobjašnjene etiologije. [**Laboratory Epidemic of Unknown Aetiology in Yugoslavia**].—*Jugoslov. vet. Glasn.* **19.** 396–399. 1

diagram, 1 caricature. [French and German summaries].

A description of a disease attacking many of the workers on the staff of the Veterinary Experiment Station and the Institute of Veterinary Hygiene at Zagreb in October, 1938. There was fever of short duration accompanied by vomiting and a cough and enlargement of the spleen and liver. The symptoms cleared up quickly but recurred twice at nine-day intervals. All the persons recovered. The disease was not identified and the cause remained obscure, but it was considered possible that it was due to an animal disease communicated to man, viz. a condition spoken of as "Mradan" disease of horses which was under investigation at the time. [The disease is not yet identified. It is characterized by severe yellow atrophy of the liver. No reference to a description of the disease is yet available.]
—B. Oswald (Novi, Yugoslavia).

Matthiakis, E. (1939). Une curieuse dermatose chez le cheval. [**A Curious Dermatosis in Horses in Greece**].—*Ann. Méd. vét.* **84**. 299–307. 4 figs., 1 table.

The condition described occurred in seven imported Polish horses. The hair fell out, producing criss-cross polygons inside which the skin was normal, giving a leopard like appearance. The area affected extended from the shoulders to the hind quarters and one side only of the body was affected. The skin remained supple and healthy. No treatment was adopted and recovery commenced in five to six days. Microscopic examination of the hairs and of skin scrapings revealed no abnormality. Haematological and certain biochemical analyses were negative. M. considers that the curious unilateral aspect of the lesion suggests an external cause, such as photosensitization by the sun acting through hospital windows on horses wearing dyed blankets.—R. Fischer.

Hastings, E. G., & Peterson, E. H. (1940). **The Deterioration of the Bovine Udder in the Absence of Streptococci.**—*J. agric. Res.* **60**. 145–156. 6 tables. [14 refs.]

The chemical composition and bacterial flora of the fore milk of 11 Holstein-Friesian cows was studied during the first, second and third lactation periods. The animals were kept under suitable conditions of isolation, milking was done by machine, and care was taken to prevent dietetic deficiencies from playing any significant part in the progress of the experiment. Samples of milk were taken at weekly intervals throughout most of the period of observation and were examined as to their chlorine content and catalase value and for the number and kinds of bacteria. In all cases the percentage of chlorine and catalase increased from time to time and also as each lactation passed, indicating some degree of deterioration of the udder. Bacteriological studies showed a complete absence of udder streptococci although particular attention was paid to their detection; nor was any other organism found with sufficient consistency and in sufficient numbers to be apparently responsible for the changes noted in the milk and in the structure of the udder. The authors conclude that the causes of mastitis or of deterioration of the udder may be more complex than is now supposed, and they indicate the need for a more detailed and more prolonged study of the subject.—J. R. Lawson.

Batman, V. K. (1940). Enzootícheskaya bronkhopnevmoniya telyat i mery bor'by s neyu. [**Enzootic Broncho-Pneumonia in Calves and Its Control**].—*Sovyet. Vet.* No. 1. pp. 12–18.

From 1934–1938 novoarsenol was administered as a preventative to 1,558 calves on farms where cases of enzootic broncho-pneumonia had occurred. B. reports that no further cases were observed.—E. Martin.

Dellahute, J. W. (1939). **An Experimental Study of Homologous Hyperimmune Serum in the Prevention of Acute Dysentery of Newborn Calves.**—*Vet. Med.* **34**. 553–554. 2 tables. [8 refs.]

Over a period of 10 years, a herd of 250 Holstein cows suffered severe losses due to calf dysentery. During a period of 5½ months the average mortality among the calves from acute dysentery was 40·8%. *Escherichia acidi lactici* and *E. communior* were recovered from cultures made from the organs of a large proportion of cases after autopsy. A cow was hyperimmunized against these organisms, and an immune serum prepared. During the following 5½ months, approximately one-half of the calves received 100 c.c. of serum intravenously as soon after birth as possible. The dose was repeated after 24 hours. The remainder of the calves were untreated, and served as controls. Of 58 treated calves only four died (6·9%). In each of the latter the first injection was inadvertently delayed for 16–32 hours after birth. Of 65

untreated calves 15 succumbed to the disease (23·1%). Colon type bacilli were recovered in more than 50% of the calves that died. Laboratory studies demonstrated that although the serum was effective as a prophylactic it was probably valueless as a therapeutic agent. Normal cow serum from the parent herd had neither prophylactic nor therapeutic value.

—D. D. Ogilvie.

Polverini, R. (1940). Sopra una speciale lesione infiammatoria della nictitante nei bovi (blefarite ipertrofica eosinofilica periodica). [**Periodic Eosinophile Hypertrophic Blepharitis in Bovines**].—*Nuovo Ercol.* **45.** 1–16. 6 text figs., 1 fig. on 1 plate. [14 refs.]

This is a condition which occasionally occurs in summer. The lesion appears in the form of a small rose-coloured lump, which grows rapidly and may attain the size of a pigeon's egg. Projecting beyond the edge of the eyelid, it may cover a considerable part of the eyeball and obscure the vision. Pruritus and consequent rubbing frequently lead to ulceration. What appeared to be nematode larvae were seen in sections cut from one lesion.

P. expresses the opinion that the lesion is caused by a helminth parasite and that its periodicity is dependent on the life-cycle of the causative agent.—E. Martin.

Rudolf, J. (1938). Veterinärkontrolle der anerkannten Geflügelzuchtbetriebe im Gau Niederdonau. [**Veterinary Control of Approved Poultry Breeding Farms in the Lower Danube**].—*Dtsch. tierärztl. Wschr.* **46.** 789–791. 2 tables.

Pullorum disease and coccidiosis are fairly widespread on the Lower Danube. In order to create breeding establishments capable of producing healthy, high-grade poultry, uniform conditions have been laid down which must be fulfilled before a poultry farm is recognized as a utility breeding farm. The conditions include the following :– all breeders desirous of recognition must apply every year and submit to inspection. A pedigree extending back for two generations is required for cocks. Only birds over one year old which have laid not less than 154 eggs with an average weight of 54 g. in their first year may be used for breeding. Recognized poultry farms must undertake their own hatching. Special importance is attached to the provision of sufficiently large poultry houses and runs. Tube agglutination tests must be made of the blood of all birds for *Salmonella pullorum* infection at least once every year ; the older birds before October 15th and young birds before April 15th. The blood samples must be taken by a qualified veterinarian. Positive reactors must immediately be eliminated. If their number exceeds 2%, a second blood test of all birds must be made after 3–4 weeks or, if the farm is very large and has isolation facilities, of all birds in the infected premises. All dead hens and chicks must be submitted for P.M. examination. Farms with more than 10% positive reactors are not recognized even if all positive reactors are immediately eliminated. These methods of control have given good results in practice.

—Sassenhoff.

Van Es, L., & Olney, J. F. (1940). **An Enquiry into the Influence of Environment on the Incidence of Poultry Diseases.**—*Res. Bull. Neb. agric. Exp. Sta.* No. 118. pp. 57. 15 figs., 34 tables. [11 refs.]

This investigation concerns the incidence and transmission of bacillary white diarrhoea, fowl typhoid, fowl cholera, tuberculosis, and coccidiosis of poultry, and blackhead of turkeys under moderately good and bad hygienic conditions, the food, housing, area of the runs, and cleansing being identical for each series of tests.

Negative results were obtained from attempts to determine whether or not healthy, non-reacting fowls, exposed to others affected with bacillary white diarrhoea, would acquire positive titres by environmental contact. Good hygiene affected favourably the incidence of fowl typhoid, but had little or no effect on the spread of fowl cholera or TB. Healthy adult fowls exhibited quite a well marked resistance to TB. under all conditions. Tests on the control of coccidiosis showed that substitution of raised hardware-cloth panels for the raised wire-mesh floors, together with adequate protection of the food and water supplies against faecal contamination, were effective preventive measures. For both fowl typhoid and blackhead a thick surface of coarse gravel over the runs was found to be an effective control measure (the temperature was 16°F. higher in such runs in the summer months than in runs with soil surfaces). The age group distribution of death from blackhead after exposure of four-week-old turkey poults is shown by a graph.—C. V. Watkins.

ROBERTS, E., SEVERENS, J. M., & CARD, L. E. (1939). **Effect of Environment on the Expression of Resistance and Susceptibility to Disease in the Domestic Fowl.** —*Proc. 7th World's Poult. Congr., 1939.* pp. 431–434. 9 tables. [2 refs.] Washington, D.C.: U.S. Dep. Agric. [In English].

The relation of environment to the expression of hereditary factors or genes is discussed at length; instances are given to show the adverse effect of unsatisfactory surroundings (management) on an individual following infection with any disease-producing organism.

The previous genetic work of the authors on pullorum disease is reviewed [*V. B.* **6**. 853]. In tests for resistance to this disease, it was found that unless a sound ration is used there may be difficulty in demonstrating expression of genic composition of a bird, particularly of physiological characters such as egg production and resistance to disease. In these tests, laying mash was used during one period instead of the usual chick mash. There was an abnormally high mortality among the uninoculated controls. No evidence could be found to show that the controls were accidentally infected by *Salmonella pullorum*, and the cause of the deaths could not be ascertained. The composition is given of various diets used in experiments to demonstrate the interaction of environment and genes. The food value of alfalfa for growing chicks under conditions of genetic experiments was investigated, and, after carefully controlled tests, it was concluded that alfalfa or something associated with it was responsible for the greater mortality following digestive disturbances in chicks on diets in which alfalfa was an ingredient.—S. G. IYER.

BLOOM, F. (1939). **Classification and Pathology of Renal Disease in the Dog. Comparison with Nephritis of Man.**—*Arch. Path.* **28**. 236–245. 3 figs. [14 refs.]

This work is based on extensive histological examinations of 70 cases of clinical kidney disease in dogs, and of 108 dogs not showing clinical renal disease but found to be affected with nephritis. B. concludes therefrom that in the dog interstitial nephritis is by far the most common renal inflammatory disease. Glomerulonephritis is extremely rare in dogs though very common in man.

In interstitial nephritis in dogs the initial pathological process consists of lymphocytic infiltration in the interstitial tissue; it is perivascular, periglomerular, and peritubular in distribution and may be acute, subacute, or chronic. The histological appearance of these changes is illustrated in photomicrographs, which show their sequence and reveal that the glomeruli are not involved in the surrounding inflammation, except in chronic cases when they are subjected to compression by the shrinkage of the kidney tissue. The reader is referred to the original for further details.—J. E.

FRITZCHE, K. (1939). Uebertragbarkeit der Marek'schen Hühnerlähmung. [**Transmissibility of Marek's Fowl Paralysis**]. —*Proc. 7th World's Poult. Congr., 1939.* pp. 289–291. Washington, D.C.: U.S. Dep. Agric. [In German: English summary].

This is a very brief survey of the state of knowledge, in 1937, on the aetiology of fowl paralysis. Experiments conducted by many workers in various countries are enumerated, and it is stated that the diversity in the nature of these experiments permits only very few conclusions to be drawn. Fowl paralysis is definitely transmissible, both by natural spreading and by artificial means. Artificial transmission has been easiest in chicks and in young birds up to ten weeks old. It is pointed out that in attempts at artificial transmission by means of an as yet unknown agent there is the possibility that the result may be a certain immunity instead of infection. The disease has been transmitted through the egg and by contact. Arguments are adduced to refute the theory that fowl paralysis is a "constitutional disease."

F. concludes that the fowl paralysis agent is a filtrable, glycerin-proof virus, resistant to prolonged desiccation.—E. MARTIN.

KEMÉNY, A. (1939). Egy új átoltható tyúksarcoma. [**A New Transmissible Fowl Sarcoma**].—*Thesis, Budapest.* pp. 15. 4 figs. [Numerous refs.] [German summary].

The tumour described was observed on the leg of a two-year-old hen. It was classed as a fibrosarcoma, similar to "Rous I". Transmission was successful both by means of a tumour tissue emulsion and of a cell-free filtrate. Seventy-two animals were inoculated and observed during ten months. Tumours began to develop 18–25 days after inoculation. The agent remained virulent for 7–9 weeks in 50% glycerin.—E. MARTIN.

Mohos, J. (1939). A sarkoma es tyúkleukosis kösös eredetéhez. **[Common Origin of Sarcoma and Fowl Leucosis].**—*Thesis, Budapest.* pp. 15. 3 figs. [Numerous refs.] [German summary].

Multiple tumours found in liver and spleen of a Rhode Island Red hen were identified as sarcomata. The blood-picture offered no leucosis characteristics. Two hens were inoculated intravenously with emulsion from the tumours. One died on the 46th day, the other on the 78th day. The P.M. examination revealed typical erythroleucosis. The virus was successfully transmitted through 16 generations, always producing erythroleucosis but never sarcoma. Transmission by cell-free filtrate was successful in the 3rd, 4th and 6th generations. Dried material was infective up to the 5th day and material preserved in glycerin up to the 25th day.

All deaths among other poultry on the same farm were investigated but no further cases of sarcoma were discovered. There was one death from erythroleucosis, but attempts to transmit the virus to ten birds failed.

No opinion is expressed regarding the connexion between erythroleucosis and tumours, or their common origin, as suggested by other authors.—E. Martin.

Ogata, T. (1937). Theoretische Ueberlegungen über das Wesen der Leukämie. **[Theoretical Considerations on the Nature of Leucaemia].**—*Gann.* **31.** 525–545. 1 table. [In Japanese: German summary]. [Abst. in *Amer. J. Cancer.* **36.** 522, copied *verbatim.* Signed: Milton J. Eisen].

The author considers leukemia, pseudoleukemia, circumscribed lymphoma or myeloma and generalized lymphosarcoma or myelosarcoma as graded expressions of basic neoplastic disease of the hematopoietic system. The generalized form with manifestations in the circulating blood is the most differentiated type or the neoplastic counterpart of physiological hyperplasia of the blood-forming tissues, in distinction to the remaining forms which are representative of increasing degrees of anaplasia.

Rous, P., & Kidd, J. G. (1938). **The Carcinogenic Effect of a Papilloma Virus on the Tarred Skin of Rabbits. I. Description of the Phenomenon.**—*J. exp. Med.* **67.** 399–428. Numerous figs. on 6 plates, 5 charts. [19 refs.]

Kidd, J. G., & Rous, P. (1938). **The Carcinogenic Effect of a Papilloma Virus on the Tarred Skin of Rabbits. II. Major Factors Determining the Phenomenon: the Manifold Effects of Tarring.**—*Ibid.* **68.** 529–562. 25 figs. on 6 plates, 12 charts. [15 refs.]

I. Experiments were carried out dealing with the production of gross changes in the tarred skins of the ears of rabbits following intravenous injection with the virus causing cutaneous papillomata in Western cottontail rabbits. The tar employed was a special horizontal retort Dutch coal tar capable of inducing cancer in mice and benign growths in rabbits. The development of the growths caused by tarring alone was compared with that due to the virus alone and with that due to a combination of tarring and injected virus. Whereas virus alone elicits papillomata in great variety, it rapidly produces carcinomas on the tarred epidermis, since only in one out of 90 tarred but uninoculated rabbits did any malignant growths occur. The development of these malignant growths seems to depend directly on the degree to which localization of the virus in the ear occurred. The macroscopic and microscopic pathological lesions are fully discussed and illustrated by numerous plates.

II. Benign and malignant tumours were developed in rabbit skins, prepared by repeated tarrings, following injection of glycerolated extracts of the rabbit papilloma virus; these appeared only in individuals very susceptible to the action of the virus. There is no evidence that the characters of the resultant growths were due to any differences in the potentialities of the virus employed. The character of the individual anomalous tumours depended partly upon the extent of the preparatory changes in the cells, malignant growths appearing more frequently when the epidermis had been tarred for a longer period. They were focal or punctate in origin, and had an individual character and were not due to secondary alterations in ordinary papillomata. After the virus had localized in the epidermis the number of growths was not increased by subsequent tarring. These tumours are the outcome of the condition of the cells at the time of virus infection.

Besides causing this change of the cells leading to unusual tumours after virus action, tarring was notably effective in determining localization of the virus from the blood stream;

in enabling the virus to produce growths which otherwise would not have been produced; in stimulating the proliferation of the tumours, making them disorderly and aggressive, and in hastening the anaplasia of such tumours as are malignant.—ALFRED EDEN.

AMANO, S., & TOMITA, T. (1938). Studien über die allgemeine Disposition bei experimenteller Krebserzeugung. Mitteilung IV. Männliches Geschlechtshormon und Hepatombildung. **[Studies on the General Disposition in Experimental Production of Cancer. 4th Report. Male Sex Hormone and Hepatoma Formation].**—*Gann.* **32.** 73–83. 1 fig., 5 tables. [10 refs.] [In Japanese: German summary]. [Abst. in *Amer. J. Cancer.* **36.** 616, copied *verbatim.* Signed: W. NAKAHARA].

o-Amido-azotoluol was administered with their food to three groups of rats. One group was injected weekly with androstin, a preparation of the male sex hormone; another group was fed large amounts of cholesterin, and the third group was untreated. All the rats received o-amido-azotoluol for 270 days; at the end of that time the survivors were killed and the liver findings compared.

In male rats androstin accelerated the development of liver tumors, and large liver cancers were found (4 rats). In the cholesterin and control groups (3–5 rats) the liver cancer development was less striking, the majority showing only nodular hyperplasia and adenoma.

Female rats in the same three groups (2–3 rats) all failed to show liver cancer. It would be of interest to study the effect of the female sex hormone on the production of liver cancer in females.

[The number of animals in each group is too small to justify a definite conclusion.]

CLAUDE, A. (1939). **Chemical Composition of the Tumor-Producing Fraction of Chicken Tumor I.**—*Science.* **90.** 213–214. [12 refs.]

The agent transmitting chicken tumor I can be separated quantitatively from tumour extracts; this purified tumour fraction can be resolved into two chief components, *viz*, a lipoid fraction and a protein fraction. A study of the chemical and physical properties of these fractions indicates that about 35% of the total dry weight of the purified material is a complex lipoid material from which two main fractions can be separated. The more abundant of the two fractions has the general composition and properties of a phosphatide and gave a strong reaction for aldehydes. It is suggested that this aldehyde group plays a part in the so-called spontaneous inactivation of the tumour agent. Studies of the protein portion of the tumour material indicate that the nucleoprotein which forms a large part of this fraction, is of the ribose type. By differential centrifugation at high speed it is possible to separate from normal chick embryo a fraction which resembles in many respects, the active fraction of chicken tumour I. The chick embryo material, like the tumour fraction, consists essentially of a phospholipid-aldehyde portion associated with a nucleoprotein of the ribose type.—R. A.

MALLUCHE, H. (1938). Immunitätsversuche am Brown-Pearce-Tumor des Kaninchens durch vorherige Impfung von Tumorfiltraten. **[Immunity Experiments with Tumour Filtrates on the Brown-Pearce Rabbit Tumour].**—*Beitr. klin. Chir.* **167.** 481–494. 1 chart. [Numerous refs.] [Abst. in *Amer. J. Cancer.* **39.** 264, copied *verbatim.* Signed: Milton J. EISEN].

The course of the Brown-Pearce tumor in rabbits was not significantly altered by intratesticular or subcutaneous injections of Berkefeld filtrates of the tumor prior to transplantation.

GHEORGHIU, I. (1938). Les epizooties du cancer de cage chez les souris. **[Cage Epizootics of Cancer among Mice].**—*Bull. Ass. franç. Cancer.* **27.** 480–489. 5 figs. [Abst. in *Amer. J. Cancer.* **35.** 117–118, copied *verbatim.* Signed: L. FOULDS].

On the basis of his observation of a high incidence of cancer among mice kept in the same cages, the author considers that the existence of cage epizootics of cancer is established and he accepts the views advanced many years ago by Borrel. The mice were infested with a variety of parasites, and filaria were demonstrated in the tissues. It is supposed that the parasites act like agents such as tar by reducing the defensive powers of cells so that these are easily invaded by the hypothetical cancer virus. It is said to be incontestable that filaria produce tumors, either carcinoma or sarcoma according, probably, to the virus carried by the filaria. [The experimental

details and the discussion are equally unconvincing].

MENKIN, V. (1938). **Studies on Inflammation. XIV. Isolation of the Factor Concerned with Increased Capillary Permeability in Injury. XV. Concerning the Mechanism of Cell Migration. XVI. On the Formation of a Chemotactic Substance by Enzymatic Action.**—*J. exp. Med.* **67.** 129–144, 145–152 and 153–158. 1 text fig., 7 figs. on 3 plates, 6 tables. [Numerous refs.] [Author's summaries copied *verbatim*]. [For part XIII. see *V. B.* **8.** 41].

XIV. There is present in inflammatory exudates a factor which induces a prompt increase in the permeability of normal capillaries. Its liberation and presence in exudates offers a reasonable explanation for the mechanism of increased permeability of small vessels in injured tissue.

A method for the isolation and purification of this permeability factor has been described. In its essential features, this consists of treating the exudate with pyridine followed by acetone. After separation of the protein fractions further purification can be obtained by prolonged extraction with butyl alcohol or by subjecting the acetone supernatant fraction to low temperature (–20°C.). The latter favors spontaneous separation of the active principle. The purified material is a crystalline doubly refractive nitrogenous substance.

The factor is evidently not a protein, yet it contains amino and carboxyl groups. It gives a positive test for the presence of an indole nucleus in its structure (Adamkiewicz test). The active material is dialyzable; and it is precipitated by concentrated ammonium sulfate. The present evidence indicates that it is an intermediary breakdown product of protein metabolism, probably belonging to the group of relatively simple polypetides. Further studies are being conducted in an endeavour to determine its precise chemical structure.

XV. A crystalline nitrogenous substance recovered from inflammatory exudates induces in cutaneous tissue a rapid migration of polymorphonuclear cells through the endothelial wall of small vessels. For the sake of convenience the tentative name of leukotaxine has been proposed for this active substance which *per se* is capable of rapidly reproducing the basic sequences of the inflammatory reaction, namely, the initial increased capillary permeability followed by the outward migration of polymorphonuclear leukocytes. Comparison of the effect of various inflammatory irritants (*e.g.* turpentine or aleuronat) with that of leukotaxine indicates that the migration of cells does not seem to be primarily referable to the initial increase in vascular permeation. Furthermore leukotaxine is definitely chemotactic. It induces an active migration of leukocytes into capillary glass tubes containing this substance.

The relation of leukotaxine to the mechanism of cellular migration at the site of inflammation is pointed out.

XVI. Blood serum digested by trypsin yields split products which, when injected into the skin of normal rabbits, rapidly increase the permeability of small cutaneous vessels. This is likewise followed in the affected tissue by prompt local migration of polymorphonuclear leukocytes.

The tryptic digest of blood serum can be purified by methods previously described [see part XIV]. The resulting crystalline substance alters the permeability of the capillary wall and favors local migration of leukocytes in a manner similar to leukotaxine proper. The present observations indicate that leukotaxine, or a substance having at least identical biological properties, appears to have been formed by proteolytic enzymic action on an otherwise relatively inactive blood serum. This finding serves as additional evidence in support of the view that leukotaxine, recovered from inflammatory exudates, is probably an intermediary product of protein catabolism.

MENKIN, V. (1939). **Inflammation. XVII. Direct Effect of Changes in the Hydrogen-Ion-Concentration of Leukocytes.**—*Arch. Path.* **27.** 115–121. 2 figs. [11 refs.]

Inflammatory exudates obtained from the chest cavity of dogs, 24 hours after intrathoracic injection of 1–2 c.c. of turpentine, and from the peritoneal cavity of mice, 1–2 days after intraperitoneal injection with 0·5 c.c. of olive oil, were mixed with standard buffer solutions to give a range of pH 6·0–7·6 and with lactic acid buffer mixtures to give a range of pH 5·0–7·2. A series of slide preparations (coverslips paraffin-sealed) was made of mixtures of a drop of exudate and two drops of each buffer mixture, and incubated at 37°C. for 1–2 hours, after staining with neutral red by Sabin's technique. The mixtures were examined microscopically for motility of leucocytes,

staining quality, extent of cytolysis and vacuolation, and agglutinating tendency. An acid reaction of pH 6·6 was distinctly injurious to the polymorphonuclear leucocytes of the dog exudate, while the macrophages of the mouse exudate were unaffected until pH 5·5 was reached.—R. O. Muir.

Straker, Edith, Hill, A. B., Lovell, R., & Rosher, A. B. (1939). **A Study of the Nasopharyngeal Bacterial Flora of Different Groups of Persons Observed in London and South-East England during the Years 1930 to 1937, Together with some Observations on the Occurrence of *H. influenzae* in the Trachea.**—*Rep. publ. Hlth med. Subj., Lond.* No. 90. pp. 131. 9 figs., 40 tables. [Numerous refs.]

Taken together these observations present a picture of the normal flora of the human respiratory tract and the changes it undergoes in response to a variety of factors such as age, weather, and hygienic conditions. [There has been no adequate report on the bacteria normally present in the nasopharynx of any species of domestic animals, or on the factors which affect the carrier rate. A study of this nature would be of obvious value in several of the respiratory diseases of domestic animals, particularly of those affecting young animals kept under intensive conditions, where there is little exact information regarding the changes which precede an outbreak of disease.—See Jones and Little. (1922). *J. exp. Med.* **36.** 273. From the comparative aspect the findings of this report and the general conclusions drawn will be of obvious interest to veterinary research workers studying these problems.]

The organisms studied and the nasopharyngeal carrier rates were as follows :– *Streptococcus pneumoniae* 20–40 % ; haemolytic streptococci 5–15 % ; *Haemophilus influenzae* 40–80 % ; and *Neisseria meningitidus* 5–20 %. The nasal carrier rates were distinctly lower than the nasopharyngeal rates in adults, but in children this difference was not so marked. The fact that outbreaks of tonsillitis are usually due to the spread of one dominant type of haemolytic streptococcus which replaces other types was confirmed. The carrier rate tended to remain constant, but there was a continual interchange of species and types between individuals, and after a certain time *H. influenzae* and *Str. pneumoniae* occurred for a short or long period in all individuals studied. It was considered that, if enough swabbings had been performed, the other organisms studied would have been found in every individual. It was, therefore, concluded that potentially pathogenic bacteria may be widely distributed in a population even in the absence of clinical disease.

It was also shown that whilst the nasopharyngeal carrier rate tended to remain fairly constant, infection with a virus and the climatic conditions of the first quarter of the year favoured invasion of the trachea and the nasal mucosa by certain types of potentially pathogenic bacteria.

—John Francis.

NUTRITION IN RELATION TO DISEASE

Hume, Eleanor Margaret, Nunn, L. C. A., Smedley-Maclean, Ida, & Smith, Hannah H. (1940). **Fat-Deficiency Disease of Rats. The Relative Curative Potencies of Methyl Linoleate and Methyl Arachidonate with a Note on the Action of the Methyl Esters of Fatty Acids from Cod Liver Oil.**—*Biochem. J.* **34.** 879–883. 2 tables. [10 refs.]

Smedley-Maclean, Ida, & Nunn, L. C. A. (1940). **Fat-Deficiency Disease of Rats. The Effects of Doses of Methyl Arachidonate and Linoleate on Fat Metabolism, with a Note on the Estimation of Arachidonic Acid.**—*Ibid.* 884–902. 9 tables. [Numerous refs.]

I. The comparative effects of methyl arachidonate, prepared from pig's liver and from ox suprarenal glands, and of methyl linoleate were determined on 45 rats, of which 26 received supplements of arachidonate, 11 of linoleate and 8 served as untreated controls. The rats received a fat-free diet from weaning, supplemented with vitamins A, D and E ; addition of the test materials to the diet was begun about the 145th day and continued for five weeks. Methyl arachidonate was found to be about twice as active as the linoleate in promoting weight increase, but its activity in curing skin lesions was no greater than that of methyl linoleate. Both compounds, unless given in very small doses, continued to exert a beneficial effect for some time after dosage had been stopped. The efficacy of methyl esters of cod liver oil acids as a prophylactic against the fat deficiency disease was very slight.

II. Estimations were made of the total lipoid matter, the percentage of phospholipin, and the amount of arachidonic acid present in the livers, kidneys and samples of muscles of rats used in I. The results indicate that arachidonic acid plays an essential part in fat metabolism in two distinct processes :- (1) a minimum intake of this acid is necessary in order that the cells of the fat depots may first be loaded up with fat, and (2) after this, growth takes place which is associated with a disappearance of the excessive fat deposits and the intake of a large excess of arachidonic acid which is converted into other products and is not stored as such in the body.—R. Allcroft.

Norris, L. C., Caskey, C. D., & Bauernfeind, J. C. (1940). **Malformation of the Tarso-Metatarsal and Phalangeal Bones of Chicks.**—*Poult. Sci.* **19.** 219–223. 2 figs., 2 tables. [4 refs.]

This condition, which is characterized by " crooked toes ", was at one time believed to be due to a deficiency of riboflavin. In a controlled experiment synthetic riboflavin fed to chicks at a preliminary stage of the bone disease was ineffective in preventing further development of the condition ; further it would not respond to treatment by injection with manganese chloride, as in the case of perosis. It has been considered that housing on an unsuitable type of floor was a factor in causation. Day-old chicks were kept in pens with paper-covered floors and others were kept in pens with wire-mesh floors, 178 being used altogether ; the incidence of the condition was much greater in those on paper-covered floors.

The authors suggest that the primary cause of the condition may be of an hereditary nature or else that some dietetic deficiency, other than lack of riboflavin or manganese, may be involved.—S. G. Iyer.

Waterman, L., Kok, D. J., & Hirschfeld, W. K. (1937). **Hyperchromic Anaemia following Partial Gastrectomy (Billroth II) in Swine.**—*Acta brev. neerl. Physiol.* **7.** 30–31. [5 refs.] [In English].

Three months after a resection of the pyloric part of the stomach (Billroth II), three pigs developed hyperchromic anaemia with nausea and diarrhoea. The disorder was improved by parenteral treatment with Pernaemon forte (a liver extract of high potency) ; haemoglobin, red blood cell count, and number of reticulocytes were increased.—R. Allcroft.

Olver, A., Ackroyd, W. R., Viswanath, B., Sen, K. C., Ware, F., Bhatia, S. L., Hydari, A., Wad, Y. W., Wright, N. C., Subrahmanyan, & Basu, K. P. (1937). **Nutrition in Relation to Human Beings, Farm Livestock and Crops.**—*Proc. 24th Ind. Sci. Congr., 1937.* pp. 471–476. Calcutta : Royal Asiatic Society of Bengal.

The main point of this discussion was that a larger proportion of the protective foods of animal origin, such as milk, eggs, meat, fish, and fresh vegetables, is essential in order to improve the diet of the people of India. This could be brought about by improvement in agricultural methods, and encouragement of mixed farming so that the greatest possible return from the land could be obtained. In this the provision of better and more remunerative cattle and poultry would play an important part.—R. Allcroft.

Underwood, E. J., Beck, A. B., & Shier, F. L. (1939). **Further Experiments on the Incidence and Control of Pica in Sheep in the Botulism Areas of Western Australia.**—*Aust. J. exp. Biol. med. Sci.* **17.** 183–192. [5 refs.]

Experiments are described for testing the effects of feeding various supplements on pica (sarcophagia), which causes sheep to consume rabbit carcasses and other carrion in the late summer period in the botulism areas of Western Australia. The condition was found to be definitely associated with a low nutritive value of the dry summer grazings, especially with the inadequate available protein and energy value of the fodder. Lack of minerals or vitamins did not appear to be significant factors in the production of pica.

Supplementary feeding with cereal silage, cereal hay, or molasses did not prevent pica, since these supplements are low in protein. Small supplements of protein concentrates were also ineffective, since the energy intake was low. A combination of such materials in sufficient quantities was, however, highly effective. Regular small quantities of fresh green forage (green lucerne, sprouted oats) did not cure the condition, but amounts as large as 2 lb. green lucerne per head daily had a significant beneficial effect. " Acquired habit " is a factor in the incidence of pica, and its practical importance is discussed.—H. B. Carter.

Underwood, E. J., Harvey, R. J., & Beck, A. B. (1939). **Biochemical Data on**

the Blood and Urine of Sheep in the Botulism Areas of Western Australia.—*Aust. J. exp. Biol. med. Sci.* **17.** 193–203. 1 fig., 6 tables. [17 refs.]

No correlation was found by the authors between blood and urine pH, blood alkali reserve, blood sugar and haemoglobin, and the onset or disappearance of pica as measured by the consumption of rabbit carcasses by experimental sheep under a wide range of nutritive conditions. Over 300 determinations of the above constituents were carried out and gave the following mean results :– blood pH 7·29 (range 7·09–7·86), alkali-reserve 55·0 vol. % CO_2 (range 38·6–73·4), haemoglobin 10·8 g. Hb per 100 c.c. (range 9·4–12·8), blood N.P.N. (24 determinations) average 37·9 mg. % (range 31·1–46·7). The authors also draw attention, with supporting data, to the extreme variability of the above constituents in sheep under apparently identical conditions, and in the same sheep from day to day and even at different times in the same day.—M. C. Franklin.

I. Green, H. H. (1939). **Recent Advances in our Knowledge of Diseases Associated with Mineral Balance in the Blood of Ruminants.**—*Vet. Rec.* **51.** 1179–1198.

II. Anon. **Our Knowledge of Bovine Diseases Associated with Disturbed Mineral Metabolism.**—*Ibid.* 1199–1200.

I. A general review paper in which G. discusses Ca, Mg and P balance in the blood and considers the evidence for the endocrine control of these minerals in the blood of cattle. It has been clearly established that the level of plasma Ca is under the influence of a rigorous physiological controlling mechanism, whereas the level of plasma phosphate is not so specifically controlled. G. illustrates this point in regard to osteofibrosis in equines, and osteomalacia in bovines. In these diseases it has been found that a deficiency of P in the food is rapidly followed by a fall in plasma phosphate, whereas food deficiency in Ca does not usually result in very marked alteration in the plasma level of this mineral in the adult animal, even though it may be showing marked clinical symptoms *e.g.* equine osteofibrosis. These facts clearly indicate the existence of a Ca-controlling mechanism which can mobilize skeletal Ca to make good dietary deficiencies. This mechanism is also exemplified in recovery from milk fever, where the nervous stimulation of udder inflation is sufficient to restore and maintain the normal level of blood Ca despite the increased demands for Ca imposed by a high secretion in the milk. The generally accepted physiological mechanism for control of plasma Ca is the parathyroid glands operating in conjunction with the autonomic nervous system, but other endocrine glands, notably the anterior lobe of the pituitary, probably also play an important part.

There also appears to be some evidence for nervous endocrine control of blood Mg, but the mechanism is not clearly understood. Limited data of the Italian workers, however, suggests that the anterior lobe of the pituitary is mainly involved, although interaction with the pineal possibly occurs. The main point of veterinary interest is that just as hypocalcaemia can appear in the bovine fed on diets high in Ca, so hypomagnesaemia can appear on diets adequate in Mg. After reviewing his own data and those of other workers, G. states that the primary disturbance in hypomagnesaemic tetany is to be regarded as dysfunction of the physiological mechanisms controlling the level of blood Mg.

Reviewing recent work on milk fever including that by Sjollema [*V. B.* **5.** 580.] and Seekles [*V. B.* **9.** 494.], and on the hormonic control of mammary activity by Kay, (1939), G. comes to the conclusion that the hypothesis of " temporary hypofunction of the parathyroids " advanced by Dryerre and Greig may now have to be modified. Temporary " disturbance of nervous endocrine equilibrium and disproportionate secretion of anterior pituitary hormones " as suggested by Seekles is, in G.'s opinion, an attractive aetiological hypothesis at present.

Dealing with bovine hypomagnesaemic tetany (" lactation tetany " and " grass tetany "), G. reviews the seasonal incidence of this disease and the conditions under which it may occur. He points out that there is no obligatory association with lactation or with grass feeding. Further, low plasma Mg may exist without any symptoms of nervous hyperirritability [see Allcroft and Green. (*V. B.* **10.** 695.)]. G. states that four main types of hypomagnesaemia are distinguishable, the types depending on the rate of fall of the blood Mg prior to clinical attack, and including a type suggesting " atypical milk fever " in which a slow fall in blood Mg is associated with a more sudden fall in blood Ca. With regard to the aetiology of hypomagnesaemia, G. concludes that no single specific factor can be incriminated, but the

evidence suggests that it is due to a dysfunction of endocrine control, precipitated by a variety of causes.

II. An editorial article dealing with the above paper, in which the controversial nature of many of the statements is referred to. The writer agrees with GREEN in that much experimental work is needed before a true understanding of the nature of milk fever and "lactation tetany" is possible. Nevertheless, the methods of treatment advocated by GREEN and BARKER have given very satisfactory results, and even though it may be impossible to fit each clinical case into its appropriate blood-salt category, sound progress has been made and there is less confusion of knowledge than formerly. Tribute is rightly paid to the original work of SJOLLEMA carried out in this particular field.—N. J. SCORGIE.

KRUPSKI, A., UEHLINGER, E., & ALMASY, F. (1939). Weitere Untersuchungen über abnorme Gliedmassenstellungen bei jungen Tieren der Braunviehrasse. Untersuchungen über den Kalzium-Phosphor-Stoffwechsel und histologische Knochenbefunde. VII. Mitteilung. **[Further Investigations in Abnormal Limb Postures in Young Swiss Brown Cattle. Calcium-Phosphorus Metabolism and Histology of the Bones. VII].** —*Schweiz. Arch. Tierheilk.* **81.** 223–232. 4 figs., 1 table. [For part VI, see *V. B.* **10.** 542].

Previous observations on malformation of limbs occurring soon after birth are extended, and two new cases described in detail. One calf, 11 weeks old, remained recumbent and was unable to maintain a standing position for any length of time. The other, aged three weeks, showed a typical forward posture of the fore-limbs with partial flexure at the carpal joints. In a seven-day balance experiment on milk diet this calf showed the satisfactory retention of 12·18 g. Ca and 7·79 g. P per day, although hyperphosphataemia and slight hypercalcaemia (11·97 mg. % serum P and 13·52 mg. % serum Ca) suggested disturbance of mineral metabolism. Histological examination of pituitary, thyroid and suprarenal glands, and of ovaries, showed nothing abnormal. Ossification was scarcely disturbed, but degenerative processes were shown at the epiphyseal cartilage of the radius with splitting and penetration of cartilaginous fragments into the spongiosa of the metaphysis. The histological picture excluded rickets, chondrodystrophia and chronic arthritis, and the aetiology of the condition is still obscure.—H. H. GREEN.

GOLDING, W. V., SCHAIBLE, P. J., & DAVIDSON, J. A. (1940). **A Breed Difference in the Manganese Requirement of Laying Hens.**—*Poult. Sci.* **19.** 263–269. 1 fig., 4 tables. [6 refs.]

Ninety White Leghorn pullets were fed for eight months on a basal ration low in manganese (9 p.p.m.) and a similar group received the same ration supplemented with 50 p.p.m. of Mn. No significant difference was observed in hatchability or in fertility between the two groups, but egg production was better in the Mn supplemented group. The results on hatchability and fertility did not agree with those of GALLOP and NORRIS [*V. B.* **9.** 574.], but those on egg production did.

In a second experiment, Barred Plymouth Rock and White Leghorn hens were fed two different basal rations low in Mn; both breeds were fed each ration with and without a Mn supplement of 50 p.p.m. The results showed that the Barred Rocks were more sensitive to lack of Mn than the White Leghorns as the hatchability and egg production of the former were significantly increased by the addition of Mn to the ration, whereas no significant difference was observed in the White Leghorn groups; chondrodystrophy was almost entirely confined to the Barred Rocks on the low Mn rations. These results indicate that a breed, or at least a strain, difference exists in laying birds as regards their Mn requirements.—R. A.

WILGUS, H. S., Jr., & PATTON, A. R. (1939). **Factors Affecting Manganese Utilization in the Chicken.**—*J. Nutrit.* **18.** 35–45. 4 tables. [Numerous refs.]

Procedures similar to those used in a previous experiment [*V. B.* **8.** 244.] were used in growth trials on chicks to ascertain the effect of P on the incidence of perosis.

The addition of phosphoric acid to make the total P between 1·0–1·3% in a basal diet containing from 0·74–1·27% Ca not only failed to aggravate perosis, but appeared to relieve the symptoms. Raising the Ca content of the diet to about 2·1% when the P level was about 0·8% did not aggravate perosis to the anticipated extent. When Ca and P levels were both increased to about 2·1% and 1·3% respectively the incidence of perosis was increased. These results indicate that P *per se* is not a causative

factor and excess Ca in the diet is apparently essential for the stimulation of perosis. Ferric citrate added to the diet in one experiment definitely showed that this salt caused perosis [see *V. B.* **8.** 722].

In vitro experiments demonstrated that insoluble calcium phosphate can remove Mn ions from solution. These results supported the hypothesis that the availability of Mn in the digestive tract of the chicken is decreased by an excess of Ca and P or by excess Fe through adsorption or combination with the insoluble salts formed. A feeding trial in which 7% of steamed bone meal, 2·92% Ca, 1·65% P and 50 p.p.m. Mn were added to the basal diet corroborated the hypothesis and showed that the perosis-aggravating action of these supplements was due to the removal of Mn from solution by the excess insoluble calcium phosphate in the intestines. Ferric hydroxide also removed Mn from solution, and the addition of ferric citrate to the diet increased the severity of the perosis.—R. Allcroft.

Goff, O. E., & Upp, C. W. (1940). **The Influence of Elemental Sulphur upon Chick Growth and Bone Ash.**—*Poult. Sci.* **19.** 270–280. 7 tables, 1 chart. [Numerous refs.]

It has been shown [*V. B.* **10.** 875.] that the feeding of elemental sulphur in the rations reduced the mortality due to coccidiosis in chicks. Other workers (1921) found that addition of 2% flowers of sulphur to the diet produced larger chicks at eight weeks, but at 14 weeks the controls were heavier. This is presumably due to the beneficial effect of the S on the coccidiosis at the earlier period, but at 14 weeks the controls which did not succumb to the infection made more rapid growth. Holmes *et al.* [*V. B.* **9.** 266.] found that the kinds of S they used retarded growth, and that additional cod liver oil was necessary to prevent rickets in the absence of direct sunlight. Irritations caused by S in poultry rations have been referred to by several workers and it is pointed out that the physiological effects of S must be considered when S is used in preventing coccidiosis.

The results of this paper show that in the absence of direct sunlight, the percentage of cod liver oil in the diet must be increased when elemental S is present, otherwise " sulphur rickets " occurs. It appears that S inhibits the effect of cod liver oil, and rickets occurs unless sufficient cod liver oil has been added to overcome this adverse effect. The addition of S did increase the growth rate of chicks from 2–8 weeks of age when sufficient cod liver oil was also present, indicating that the S gives some protection against coccidiosis. The percentage of the bone ash of the tibiae of chicks receiving increased amounts of cod liver oil was greater than of those receiving smaller doses, in the presence of the same S supplements. The results of investigations on the effect of various forms of S showed that when more than 4% was added to the rations, the greatest increase in weight of chicks occurred when commercial flour sulphur [ground rock sulphur] was used followed in order by 325-mesh S, micronized S [a very finely ground S] and flowers of S [an amorphous form prepared by sublimation]. In a previous paper [*V. B.* **10.** 875.], the authors showed that as regards the relative degrees of fineness, the ratings of flowers of sulphur and commercial flour sulphur were essentially equal; therefore the toxic properties of the former may be associated with the amorphous character of the S, rather than with the degree of fineness.—R. Allcroft.

Morgareidge, K., & Manly, Marian LeF. (1939). **Simultaneous Appearance of a Positive Line Test and Radioactive Phosphate Deposition in the Rachitic Rat Metaphysis.**—*J. Nutrit.* **18.** 411–421. 4 text figs., 5 figs. on 1 plate, 1 table. [16 refs.]

Fifty-six young rachitic rats received a single dose of radioactive P (as Na_2HPO_4) in solution by stomach tube accompanied by a single dose of vitamin D_2. At various times, up to 96 hours after dosing, determinations were made of the radioactive P content of whole blood and of the tibial diaphysis and metaphysis of the rats. Longitudinal sections of the tibiae were stained and photographed. The blood and tibiae of control rachitic rats which were given no vitamin D were also studied. There was no apparent difference between the amount of radioactive P in the blood or in the diaphyses of the rats given vitamin D and that of the controls, thus indicating that vitamin D has no influence on the entrance of P into the blood or into the diaphyseal portion of the tibia. In the rachitic metaphyses, however, the effect of vitamin D was clearly seen after 54–72 hours. The healing produced by the vitamin (as shown by the appearance of a positive line test) occurred concomitantly with a significant increase in the content of radioactive P in this

structure. In the metaphyses of the control animals the " line " did not appear nor did the content of radioactive P increase. These results support the authors' conclusions that the mode of action of vitamin D is not limited to the control of intestinal absorption of the elements concerned in calcification.—R. A.

MORGAN, Agnes Fay, SHIMOTORI, N., & HENDRICKS, Jeannette B. (1940). **Progress of Hypervitaminoses D_2 and D_3 and Recovery in Rats, as Affected by Dietary Calcium and Phosphorus and Vitamin A.**—*J. biol. Chem.* **134.** 761–779. 6 figs., 2 tables. [19 refs.]

On both low P and low Ca diets there was no appreciable improvement in bone calcification in rats given either excessive or moderate doses of vitamins D_2 or D_3. No improvement in growth, bone ash, or serum P occurred in the rats on a low P diet with excess vitamin D, and there was only slight improvement in those given either parathyroid extract or small amounts of cod liver oil. On a low Ca diet the excess vitamin D promoted soft tissue growth, but did not benefit bone formation. Excessive amounts of calciferol (D_2) were most harmful when added to a diet of normal Ca and P content and ratio, produced toxic effects with adequate Ca and low P diets, but had favourable results with low Ca and adequate P diets. The same amounts of vitamin D_3 produced even more harmful results. Low vitamin A intake aggravated these harmful effects but excess vitamin A brought about more rapid recovery when the excess vitamin D was removed from the diet. These results do not support the conclusion that vitamin D acts solely by increasing the net absorption from the intestine of Ca or P or of both, nor do they indicate that the vitamin D intake can counterbalance, or even affect, any serious derangement of the Ca : P ratio.—R. ALLCROFT.

KIRK, W. G. (1939). **The Effect of the Ingestion of Irradiated Yeast, Molds, and Ergosterol on the Antirachitic Potency of Ewe's Milk.**—*Iowa St. Coll. J. Sci.* **13.** 235–238. [4 refs.]

The results obtained from 19 lactating ewes showed that the addition of irradiated yeast, moulds, or ergosterol to the ration definitely increased the antirachitic potency of the milk, but the exposure of ewes to summer feeding conditions did not influence the vitamin D content of their milk. Irradiated yeast and moulds were found to be about twice as efficient as irradiated ergosterol. The antirachitic potency of the milk decreased rapidly after the vitamin D supplemented feeding was discontinued.—R. ALLCROFT.

JUKES, T. H., & SANFORD, T. D. (1939). **The Vitamin D Requirement of Young Turkeys.**—*J. Nutrit.* **18.** 71–85. 2 figs., 4 tables. [9 refs.]

The ash content of the tibiae at four weeks of age was used to measure the vitamin D requirement of young turkeys. Addition of 120 units (U.S.P. or A.O.A.C.) of U.S.P. reference cod liver oil per 100 g. of diet produced unsatisfactory growth and calcification ; higher levels were not fed. A linear relationship between vitamin D level and bone ash was observed when reference cod liver oil was added at levels ranging from 20–100 units per 100 g. diet. A fish oil blend (sardilene 400) containing approximately 400 A.O.A.C. chick units of vitamin D, was found a more effective source of the vitamin for turkey poults than reference cod liver oil, when compared chick unit for chick unit. Because of this the vitamin D requirements of turkeys could not be stated precisely in terms of A.O.A.C. chick units, as the possibility of a species difference in the response between turkeys and chicks is not considered by such an expression.

Vitamin D definitely influenced the growth rate of young turkeys : satisfactory growth and calcification in complete absence of sunlight were produced when 0·4 g. of fish oil blend per 100 g. of diet were given ; 0·3 g. produced definitely poorer calcification.—R. ALLCROFT.

ARON, H. C. (1939). **The Relation of Vitamin C Deficiency to Nutritional Anemia.**—*J. Nutrit.* **18.** 375–383. 1 fig., 1 table. [Numerous refs.]

When four-month-old male g. pigs of about 450 g. body weight were fed a scorbutogenic diet with an addition of ascorbic acid for 50 days or more, a period longer than the life-cycle of the erythrocyte, normal blood formation took place. Withdrawal of the ascorbic acid supplement caused a definite reduction in body weight and in the haemoglobin content of the blood within 20 days ; the anaemia thus produced was of a distinctly hypochromic type. Administration of large amounts of ascorbic acid either orally or subcutaneously cured the anaemia but only when given to animals which had lost not more than about 25% of their body weight or

one-third of their haemoglobin. The rise in haemoglobin induced by ascorbic acid administration occurred much more rapidly than the rise in body weight, indicating that the anaemia was cured long before the other body tissues were repaired.

It is concluded that these results demonstrate that ascorbic acid has a definite influence on haemoglobin formation in the g. pig.—R. A.

Borson, H. J., & Mettier, S. R. (1940). **Relief of Hypochromic Anaemia in Dogs with Synthetic Vitamin B_6 : Influence of "Filtrate Factors".**—*Proc. Soc. exp. Biol., N.Y.* **43.** 429–432. [3 refs.]

Four adult mongrel male dogs were maintained on a diet adequate in all known factors except those of the vitamin B complex ; supplements of members of this complex were given (per kg. body weight per day) as follows :– 50 μg. each of thiamin chloride and riboflavin, 1 mg. nicotinic acid, and 0·06 ml. liver extract prepared from a crude liver concentrate by repeated treatment with fuller's earth to remove the adsorbable components. This extract was shown by rat assay to be rich in Factor 2 (rat growth factor) but practically free from vitamin B_6. After 120–135 days on this régime, the dogs developed hypochromic microcytic anaemia which was relieved by the addition of 60 μg. of synthetic B_6 per kg. per day. Recovery was not complete, however, until the liver filtrate level was tripled. An adequate supply of a factor (or factors) present in the filtrate after exhaustive adsorption with fuller's earth is apparently necessary for complete relief of the anaemia resulting from deficiency of B_6.—R. Allcroft.

Jukes, T. H. (1939). **Vitamin B_6 Deficiency in Chicks.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 180–182. 1 fig. [10 refs.]

Attempts were made to produce vitamin B_6 deficiency in chicks by feeding a basal diet containing all the known requirements except vitamin B_6. Slow growth, depressed appetite and inefficient utilization of food, followed in some cases by spasmodic convulsions and death, occurred in the chicks fed the basal diet ; these symptoms were prevented by adding synthetic vitamin B_6 hydrochloride to the diet.—R. A.

I. Carter, C. W., & O'Brien, J. R. (1939). **Vitamin B Complex in Relation to the Nutrition of the Chick and Pigeon.**—*Proc. 7th World's Poult. Congr., 1939.* pp. 126–128, 3 tables. [13 refs.]

Washington, D.C. : U.S. Dep. Agric. [In English].

II. Hegsted, D. M., Oleson, J. J., Elvehjem, C. A., & Hart, E. B. (1940). **The Essential Nature of a New Growth Factor and Vitamin B_6 for Chicks.**—*Poult. Sci.* **19.** 167–176. 5 tables. [Numerous refs.]

I. Evidence is given that four distinct factors of the vitamin B complex are essential for normal nutrition of the chick and pigeon. Deficiency of vitamin B_3 (filtrate fractions of liver and yeast) and vitamin B_5 (eluate fractions) in the pigeon did not cause dermatitis similar to that seen in the chick. Neither of these factors has been identified with nicotinic acid but it is possible that B_5 is identical with B_6. Investigations on the influence of B_3, B_5 and crystalline B_6 showed that B_6 is an essential dietary factor for the chick as well as for the pigeon.

II. Studies on the use of simplified diets for chicks are reported. Day-old White Leghorn chicks were used in all experiments. It is shown that yeast and liver extract do not supply all the factors lacking in the purified diets used, and evidence of a new growth factor for chicks is presented ; the best sources of this growth factor are brain, kidney, and cartilage, while cereal products are less potent. It is extracted from kidney with difficulty, but can be readily obtained in solution from cartilage. Experiments are described which demonstrated the necessity of vitamin B_6 for the growth and maintenance of chicks. Characteristic spastic paralysis and yellow livers occurred consistently on the basal rations used, but the incidence of the former was not correlated with the occurrence of the latter, or lack of the growth factor. Kidney and brain gave good protection against paralysis, liver was less effective, and cereal products had to be fed at rather high levels for complete protection. Preliminary studies on the properties of the factor are given. The occurrence of yellow livers was not prevented by choline or other known lipotropic factors and could not be associated with any deficiency known to cause fatty degeneration.—R. Allcroft.

Bauernfeind, J. C., & Norris, L. C. (1939). **The Role of the Antidermatosis Vitamin and a New Water-Soluble Growth Factor in the Nutrition of the Mature Fowl.**—*J. Nutrit.* **18.** 579–591, 4 tables. [Numerous refs.]

A diet shown to be adequate in all the known vitamins except the antidermatosis vitamin was fed to chicks, and when supplemented with rice bran filtrate as the source of the antidermatosis vitamin, failed to produce good growth. This indicated that another factor, not identical with any of the known vitamins is required for chick growth.

Both the antidermatosis vitamin and the new factor were found necessary for reproduction in the mature fowl, but even when both these factors were added to the deficient diet normal reproduction was not attained nor was the weight of the hens maintained, although egg production was satisfactory. These results may indicate that an insufficient quantity of the new factor was fed, or that the experimental diet was deficient in another factor, or factors, required for reproduction and maintenance of weight, but not enough evidence was obtained from these experiments to draw definite conclusions.—R. ALLCROFT.

PETERSON, W. H., & ELVEHJEM, C. A. (1939). **Conditions Affecting the Content of Chick Antidermatitis Vitamin in Yeast.** —*J. Nutrit.* **18.** 181–186. 2 tables. [7 refs.]

Assays of 23 experimental batches of yeasts were made using day-old chicks which were fed on a basal diet containing all the vitamins known to be required, except the antidermatitis factor. The amount of the antidermatitis vitamin (pantothenic acid) in the yeasts varied with the medium in which the yeast was grown. That grown in grain wort contained the most; this gave protection against dermatitis when fed at a 2% level, molasses yeast at a 4%, and glucose-salts yeast at a 6% level. No difference was found between baker's and brewer's yeasts in respect to this factor, and these yeasts gave protection at the 2% level which is about the potency of liver and kidney.—R. ALLCROFT.

I. PHILLIPS, P. H., & ENGEL, R. W. (1939). **Some Histopathologic Observations on Chicks Deficient in the Chick Antidermatitis Factor or Pantothenic Acid.** —*J. Nutrit.* **18.** 227–232. 4 figs., 1 table. [8 refs.]

II. WAISMAN, H. A., MICHELSEN, O., & ELVEHJEM, C. A. (1939). **The Distribution of the Chick Anti-Dermatitis Factor (Pantothenic Acid) in Meats and Meat Products.** — *Ibid.* 247–256. 2 tables. [12 refs.]

I. The day-old White Leghorn chicks used in these experiments were fed, as a basal ration, a heated diet which produced marked dermatitis and death in the growing chick if the antidermatitis factor (pantothenic acid) was not added. The effects were studied of supplementing the basal ration with the antidermatitis factor, riboflavin, riboflavin + B_1 + nicotinic acid, molasses, and the antidermatitis factor + riboflavin. Microscopic examinations were made of the sciatic nerves, spinal cords, livers, and kidneys of 5–10 birds from each of these groups; a few observations were also made on the thymus, thyroid, striated muscle and skin. The results show clearly that pantothenic acid was necessary to prevent the occurrence of lesions in the spinal cord. Addition of nicotinic acid, riboflavin, or vitamin B_1 was not effective in preventing spinal cord lesions in chicks fed the basal ration, but the addition of molasses was effective, indicating that this contains pantothenic acid. If pantothenic acid was given without riboflavin, neuromalacia developed; addition of riboflavin without pantothenic acid caused no changes in the sciatic nerve but degeneration in the spinal cord always occurred; if both supplements were given no changes were evident in either the spinal cord or the sciatic nerve. Thymus involution, liver damage and keratitis and dermatitis in the skin was often observed in chicks affected with dermatitis.

II. Protection against dermatitis afforded to growing chicks was taken to indicate the distribution of pantothenic acid in various animal tissues. The liver and kidney were found to be the richest sources of the factor, followed by heart, spleen, brain, pancreas, tongue, and lung; the muscular tissues of beef, lamb, pork, and veal had the least potency. Stewing decreased the potency of kidney, heart, and spleen by one-third, but frying seemed to enhance the effect of liver; better growth was consistently obtained with fried beef liver than with the uncooked tissue.—R. ALLCROFT.

JUKES, T. H. (1940). **Prevention of Perosis by Choline. [Correspondence].**—*J. biol. Chem.* **134.** 789–790. 1 table. [3 refs.]

Perosis occurred after 8–12 days in young turkeys fed a basal perosis-producing diet, but the number of cases reached a maximum at 20–30 days. The addition to the diet of a mixture of synthetic thiamin, riboflavin, nicotinic acid, pyridoxin (vitamin B_6), pantothenic acid, and choline chloride gave complete protection. Another two experiments showed that

the addition of choline alone to the basal diet was effective in preventing perosis and promoting growth.—R. ALLCROFT.

MASON, H. C. (1939). **Occurrence of the Pellagra-Like Syndrome in Range Chicks.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 609–611. [12 refs.]

Pellagra-like symptoms in varying degrees of severity occurred in beaks, eyes, toes, and feathering of about 200 out of 1,000 pullorum-free White Leghorn chicks maintained on a supposedly adequate diet and permitted to range freely. P.M. examination of the affected chicks that died revealed gizzard erosions, inflammation of the duodenum and, to a lesser extent, of the spleen and kidneys, and the liver was a deep dirty yellowish colour. Gas was present in the entire intestinal tract which probably accounted for a diagnosis of *Bacterium coli* bacillosis, confirmed in severely affected chicks. It is concluded that the pellagra-like syndrome in these range chicks resembles that produced experimentally in the laboratory and is of interest bacteriologically as *Bact. coli* bacillosis was not a consistent finding.—R. A.

SMITH, D. T., MARGOLIS, G., & MARGOLIS, L. H. (1940). **The Blacktongue Curative Effect of Pyridine-β-Carboxylic Acid Diethylamide (Coramine).**—*J. Pharmacol.* **68.** 458–464. 1 fig., 3 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

1. Doses of 5 mgm. per kg. of nicotinic acid were uniformly effective in curing experimental canine blacktongue. 2. Coramine was equally effective when administered parenterally in doses of 72·5 mgm. per kg. 3. Coramine given orally at a level of 29 mgm. per kg. cured seven out of eight animals. 4. The effective dosage of coramine protected the dogs from subsequent attacks of blacktongue for an average of 48 days as compared with 47 days for nicotinic acid. 5. Patients with pellagra should receive two to three times the dog curative dose of coramine. For the average adult this would be 3 to 5 cc. of coramine daily.

SWANK, R. L. (1940). **Avian Thiamin Deficiency. A Correlation of the Pathology and Clinical Behaviour.**—*J. exp. Med.* **71.** 683–702. 15 figs. on 4 plates, 1 table, 1 chart. [Numerous refs.]

A detailed description is given of the histopathological lesions which occur in the nervous systems of acutely thiamin-deficient pigeons with opisthotonus, in chronically thiamin deficient ones with leg weakness, and in fasting pigeons without neurological symptoms. Preliminary clinical and pathological observations were made on more than 100 pigeons which were used for the detailed histological studies. It was concluded that the opisthotonus of thiamin deficiency is a manifestation of decerebration due to a temporary cessation of function of the neurons in the higher centres, thus removing the inhibitory influence from the lower brain centres, with a resultant decerebrate rigidity. As opisthotonus may be attended by no degenerating nerve fibres in either the central or peripheral nervous systems, it would appear that the presence of degenerating nerve fibres is coincidental to, rather than responsible for, the opisthotonus which is often produced by the dietary regimen used to produce this symptom. Because this impaired mechanism is not due to a structural change (degeneration), normal function can be resumed, and, in these experiments, opisthotonus disappeared shortly after thiamin was administered. On the other hand, leg weakness, when produced by a thiamin deficiency, is a lower motor neuron type of paralysis and is due to degeneration of peripheral nerve fibres within the sciatic nerve. The number of such fibres corresponded closely with the degree of paralysis, and when thiamin was added to the ration, regeneration of the nerve fibres occurred at a rate which closely paralleled the clinical improvement of the birds.—R. ALLCROFT.

ENGEL, R. W., & PHILLIPS, P. H. (1939). **Fatty Livers as a Result of Thiamin Administration in Vitamin B_1 Deficiency of the Rat and the Chick.**—*J. Nutrit.* **18.** 329–338. 4 figs., 3 tables. [13 refs.] [Authors' summary copied *verbatim*].

When thiamin was administered to vitamin B_1 deficient chicks or rats hydropic degeneration and fatty metamorphosis occurred in the parenchyma of the liver cells. This histologic reaction in the liver was not prevented by choline, lipocaic or by diets high in fat or in casein. Desiccated thyroid was effective in preventing the histologic reactions in the livers.

Chemical analyses on these livers showed that there was an increase in total fat, glycogen and moisture. The phospholipid and protein remained unchanged.

Thiamin therapy in experimental vitamin B_1 deficiency causes an excessive production of

free fat in the liver cell which disrupts the normal cell structure.

SURE, B. (1939). **Influence of Massive Doses of Vitamin B_1 on Fertility and Lactation.** —*J. Nutrit.* **18.** 187–194. [7 refs.]

Using rats as experimental animals it was shown that a daily dose of 100 μg. of thiamin [B_1] resulted in female sterility in the second generation; a daily dose of 200 μg. produced toxic effects in lactation in the third generation, and a daily dose of 400 μg. resulted in entire failure in lactation in the third generation.

—R. ALLCROFT.

WALKER, A. H. (1936). **A Study of Avitaminosis A in Dairy Calves and a Related Type of Blindness.**—*Abst. Thesis, Wisconsin.* pp. 3. [Typescript].

Experiments on 16 Holstein calves were carried out to determine the vitamins A and D contents of oat millings, the carotene requirements of the dairy calf, and the possibility of atypical blindness being caused by a vitamin A deficiency. It was found that the carotene of yellow maize was not as active as the carotene supplied as a supplement. The minimal carotene requirement of the calves was found to be 1·5–2 mg. per 100 lb. of live weight per day. Inhibition of the development of the ovaries was shown to be due to a drastic vitamin A deficiency. Four cases of typical avitaminosis-A blindness are described; two other cases were cured by feeding a carotene supplement, indicating that there was no interference in the utilization of carotene by the calf. Nine cases of atypical blindness are described, and the relationship of vitamin A to this disorder is discussed. The evidence favours the theory that some other factor is involved, although it may be a syndrome in which vitamin A plays a part.

AXELROD, A. E., LIPTON, M. A., & ELVEHJEM, C. A. (1940). **The Production of Uncomplicated Riboflavin Deficiency in the Dog.**—*Amer. J. Physiol.* **128.** 703–708. 2 figs. [14 refs.]

A synthetic basal ration when supplemented with riboflavin, thiamin, nicotinic acid, vitamin B_6 and a purified liver concentrate freed from riboflavin, was shown to be adequate for growing dogs. When no riboflavin was added, however, an acute deficiency characterized by loss of weight, sudden collapse and death occurred in 6–8 weeks.—R. ALLCROFT.

VICTOR, J. (1934). **Metabolic and Irritability Changes in Nutritional Myopathy of Rabbits and Ducks.**—*Amer. J. Physiol.* **108.** 229–236. 1 fig., 4 tables, 1 chart. [13 refs.]

Ducks and rabbits were fed on the stock and experimental diets devised by GOETTSCH and PAPPENHEIMER [(1931 & 1933). *J. exp. Med.* **54.** 145, and **57.** 365]. Physiological tests were carried out on the thigh muscles. Oxygen consumption of the dystrophic muscles of the experimental rabbits was increased up to 400% of that in the controls. Rheobasis [the minimum electric potential producing stimulation] and chronaxia [the time of excitation by a current just double the rheobasis] were greater than in the controls, rheobasis being increased more than chronaxia.

In the muscles of the experimental ducks, oxygen consumption was the same as in the controls. Rheobasis and chronaxia were increased, but to an equal extent.

[The author was unable to explain the differences in behaviour of duck and rabbit muscles, but as the diets used for ducks and rabbits were not the same, it is possible that different nutritional factors were involved.]

I. MORGULIS, S., & SPENCER, H. C. (1936). **A Study of the Dietary Factors Concerned in Nutritional Muscular Dystrophy.**—*J. Nutrit.* **11.** 573–591. 4 tables. [10 refs.]

II. MORGULIS, S., WILDER, Violet M., & EPPSTEIN, S. H. (1938). **Further Studies on Dietary Factors Associated with Nutritional Muscle Dystrophy.**—*Ibid.* **16.** 219–227. 5 figs. [5 refs.]

I. The results of experiments on rabbits maintained on the dystrophy-producing diet of GOETTSCH and PAPPENHEIMER [(1931). *J. exp. med.* **54.** 145.] showed that muscular dystrophy could not be prevented when the following supplements were added singly to the diet—dry alfalfa, a vegetable oil (mogola), lettuce, vitamin A, vitamin B (yeast) or vitamin E (cold-pressed wheat-germ oil). Prevention of the disorder as well as cure of the dystrophy already developed, were effected by adding fresh green alfalfa, lettuce and vitamin E, dry alfalfa and vitamin E, or whole wheat germ, to the dystrophic diet. From these observations it was concluded that there must be at least two factors involved in the prevention or in the cure of muscular dystrophy; both factors are present in fresh green alfalfa or in a whole wheat germ but one of them is supplied by

wheat germ oil (cold pressed), and the other is present in lettuce or in dry alfalfa. At least one of the factors is easily destroyed by ethereal-ferric chloride, by drying or by extraction with water or alcohol.

II. As it was shown [see I] that whole wheat germ was an excellent source of the essential dietary factor for prevention of muscular dystrophy, it was decided to fractionate wheat germ into its fat-soluble and water-soluble components. Experiments showed that neither fraction by itself could prevent or cure dystrophy. The fat-soluble material, incorporated into the basal diet, delayed the onset of dystrophy, whereas the water-soluble fraction did not even affect the rapidity with which dystrophy developed on the basal diet. When the two extracts were fed together, severely dystrophic rabbits recovered very quickly. It seems, therefore, that one of the essential dietary factors is present in the non-saponifiable fraction of the wheat-germ oil and that this fat-soluble factor is very closely associated, or perhaps even identical with, vitamin E, and is present in the oil of wheat germ, cotton seed, maize and also in lettuce and alfalfa. The water-soluble fraction probably belongs to the vitamin B complex because it can be furnished by lettuce, yeast and a variety of vitamin B concentrates.—R. Allcroft.

Olcott, H. S. (1938). **The Paralysis in the Young of Vitamin E Deficient Female Rats.**—*J. Nutrit.* **15.** 221–225. 4 figs on 1 plate. [13 refs.]

Rats were fed a basic diet low in vitamin E which supplied sufficient of this vitamin for reproduction but not for lactation except in a few cases. Of the litters which did survive about half the young developed paralysis, usually in the hind quarters, on about the 20th day of life [see also *V. B.* **9.** 41; **10.** 288 and 700]. Histological studies were made of the skeletal muscles and nervous systems of these young rats. The muscles were compared with those of a normal rat and of rats which had had a part of their sciatic nerve removed. The muscles of the latter did not show the marked necrosis and cellulitis that characterized the vitamin E deficient young. The heart muscle showed no histological change. No abnormalities of the nervous system were found, contrary to the findings of Lipshutz (1936) who observed degenerated nerve tracts in the cord. The condition closely resembled the nutritional muscular dystrophy described by Goetsch and Pappenheimer (1931) and others [see two preceding abstracts] in g. pigs and rabbits on a purified diet. The cure of this latter condition requires at least two factors, one of which may be vitamin E. The incidence and severity of the latter disease is increased by including cod-liver oil in the diets, which, it is explained, destroys the vitamin E by autoxidation.

—E. I. McDougall.

PUBLIC HEALTH

Hackler, J. F. (1939). **Outbreak of Staphylococcus Milk Poisoning in Pasteurized Milk.**—*Amer. J. publ. Hlth.* **29.** 1247–1249. [Numerous refs.]

A small explosive outbreak of acute gastro-intestinal intoxication due to pasteurized milk, sold as Grade "A". Potentially toxic, non-haemolytic, active zoning staphylococci were isolated from the milk and from five employees at the milk depot. Contamination apparently occurred during manual bottling and capping.

—H. E. Bywater.

THERAPEUTICS

Fuller, A. T., Colebrook, L., & Maxted, W. R. (1940). **The Mode of Action of Sulphanilamide.**—*J. Path. Bact.* **51.** 105–125. 12 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

Sulphanilamide has a direct action on the streptococcus in blood and serum and also in semi-synthetic media in the absence of immunity mechanisms. This action is greatly influenced by the constituents of the medium, and those which interfere with the action of the drug also increase the growth of the coccus.

The action of the drug in human and animal blood and its bearing on the therapeutic action in mice are discussed.

Evidence is presented against the theory that the drug acts by inhibition of the proteolytic enzyme of the coccus.

Various effects of the drug are discussed and a comparison with other bacteriostatic agents is made.

It is not possible to say whether the drug acts on a specific enzyme system or as a non-specific growth depressant.

RIMINGTON, C. (1940). **Porphyrinuric Action of 2-(*p*-aminobenzenesulphonamido) pyridine (M and B 693). Comparison with Sulphanilamide.**—*Biochem. J.* **34.** 78–81. 1 table. [12 refs.]

M & B 693, administered to rats *per os* in concentrations ranging from 0·2–2·9 g. per kg., and as the Na derivative in concentrations of 0·2–0·9 g. per kg., caused a marked increase in the urinary porphyrin excretion, thus resembling the action of sulphanilamide. At the higher levels of intake of the drug, the degree of porphyrinuria was not proportional to the dose. This may have been due to less complete absorption, but even in relation to the blood concentration levels the porphyrinuria was relatively less marked at the higher than at the lower levels.—ALFRED EDEN.

KRANEVELD, F. C., & MANSJOER, M. (1940). Over de werking van sulfanilamide en soluseptazine tegen infecties met de Pasteurella bubaliseptica bij konijnen. **[Effect of Sulphanilamide and Soluseptasine in *Past. bubaliseptica* Infection in Rabbits].**—*Ned.-ind. Bl. Diergeneesk.* **52.** 29–49. 8 tables. [Numerous refs.] [English and German summaries].

Sulphanilamide given *per os* or subcutaneously was found to increase the resistance of rabbits to a fatal dose of *Past. bubaliseptica*. Soluseptasine also had good prophylactic and curative effects when injected intravenously or subcutaneously.—L. TOBBACK.

HERRELL, W. E., & BROWN, A. E. (1939). **The Clinical Use of Sulfamethylthiazol in Infections caused by Staphylococcus Aureus: Preliminary Report.**—*Proc. Mayo Clin.* **14.** 752–758. 2 figs. [Authors' summary copied *verbatim*].

It appears that sulfamethylthiazol is a rather efficient drug in infections caused by pneumococcic and especially the staphylococcic organisms; this conclusion appears to be true not only experimentally but also in preliminary clinical work.

In addition to this factor of chemotherapeutic efficiency, there appears to be a rather definite decrease in the toxic manifestations of sulfamethylthiazol as compared to sulfapyridine, the latter drug being in itself of some known value in the treatment of staphylococcic infections. However, further observations will yield information concerning the possible delayed toxic effects of the drug, if it has any.

MAUER, G. (1938). Die Wirkung des Trypaflavins bei psittakoseinfizierten Mäusen. **[Action of Trypaflavine on Mice Infected with Psittacosis].**—*Zbl. Bakt. I.* (*Orig.*). **142.** 279–286. 7 graphs. [13 refs.]

M. succeeded in saving 50% of mice infected with psittacosis virus, when trypaflavine was administered in time and in the right quantity. The dose was proportionate to the gravity of the infection. The maximum was 0·1 mg. trypaflavine, in 0·5 c.c. solution. Infection and administration of the remedy were both intraperitoneal. When the infection was intranasal, only intravenous administration of the drug was even relatively successful, *i.e.* death could be delayed, though not averted. After intracerebral infection the drug had no effect. M. considers the effect to be specific, although the manner of its working is not yet clarified.

—V. CHLÁDEK.

VAN HOOF, F., HENRARD, C., & PEEL, E. (1940). Observations sur l'efficacité du " Bayer 205 " contre le Trypanosome gambiense. I.—Durée de la protection conférée par une dose moyenne. Effets secondaires du " Bayer 205 " sur le pouvoir pathogène des trypanosomes. II.—Action combinée de la germanine préventive et l'antigène " trypanosome ". III.—Action combinée du " Bayer 205 " et des trypanosomes sur des animaux guéris. IV.—Modifications de l'évolution de la trypanosomiase provoquées par le Bayer 205. **[Observations on the Efficacy of Bayer 205 against *T. gambiense*. I.—Duration of Protection Conferred by a Moderate Dose. Secondary Effects on the Pathogenic Power of Trypanosomes. II.—Combined Action of Protective Germanin and Trypanosome Antigen. III.—Combined Action of Bayer 205 and Trypanosomes on Recovered Animals. IV.—Changes Caused by Bayer 205 in the Development of Trypanosomiasis].**—*Ann. Soc. belge Méd. trop.* **20.** 105–116, 117–122, 123–128 and 129–135. Numerous tables. [Numerous refs.] [Dutch summary].

I. In view of the use of germanin (Bayer 205) for protective purposes in the Congo it was considered advisable to test the amount of protection it gave against local strains of *T. gambiense*. It was concluded that 0·025 g. of germanin per kg. body weight would protect a g. pig for at least 58 days against cyclically transmitted local strains. It was thought that, in the average animal, protection would last for 100 days. In these experiments trypanosome-infected tsetse flies were fed on g. pigs treated with germanin and it is suggested that, although this feeding did not clear the flies from infection, it did reduce the infectivity of some individual flies.

II. Duke [*V. B.* **6.** 727.] has recorded a case in a human being in which germanin protection lasted 327 days, and suggested that this abnormally long period might have been due to an active immunity produced by repeated injections of trypanosomes whilst the individual was under drug protection. Experiments carried out on g. pigs by inoculating trypanosomes into animals under germanin protection, did not indicate that any prolongation of the protective period was produced.

III. In order to test the state of immunity occurring in individuals which had been infected with trypanosomes and recovered under germanin treatment, treated g. pigs were exposed to infected tsetse fly or inoculated at intervals with trypanosomes. Apart from one animal which became reinfected after 70 days, the others resisted for over 200 days, and in one case for a year. In one case evidence was obtained that occasionally resistance of trypanosomes to germanin may be developed relatively easily. One animal relapsed 32 days after the administration of a normal dose of germanin, and a second administration of nearly a double dose only cleared the blood for four days.

IV. In areas where protective inoculation with Bayer 205 has been carried out periodically it is suggested that mild cases of trypanosomiasis may be produced which escape detection, but are capable of leading to tsetse infection. It is admitted that such cases may occur, but it is pointed out that cases of cryptic infection may occur in the absence of drug treatment, and that in fact they are not of much importance, as such individuals are usually weak and not capable of undertaking work which would bring them into contact with tsetse flies.—U. F. Richardson.

I & II. Lourie, E. M., & Warrington Yorke. (1939). **Studies in Chemotherapy. XXI.—The Trypanocidal Action of Certain Aromatic Diamidines. XXII.—The Action of Certain Aromatic Diamidines on *Babesia canis* Infections of Puppies.**—*Ann. trop. Med. Parasit.* **33.** 289–304 and 305–312. 7 tables. [14 refs.] [For part XX, see *V. B.* **10.** 57].

III. Adams, A. R. D., & Warrington Yorke. (1939). **Studies in Chemotherapy. XXIII.—A Case of Indian Kala-Azar Treated with 4 : 4′-Diamidino Stilbene.**—*Ibid.* 323–326. 1 fig., 2 charts. [2 refs.] [Authors' summary copied *verbatim*].

IV. Devine, J. (1940). **Studies in Chemotherapy. XXIV.—Changes in the Blood Produced by Administration of 4 : 4′-Diamidino Stilbene.**—*Ibid.* **34.** 67–71. 3 tables. [2 refs.]

I. The trypanocidal activity of a large number of aromatic compounds containing the amidine group was tested on mice. Certain members of the series (diamidino diphenoxy pentane, diamidino diphenoxy propane, and diamidino stilbene) had a marked trypanocidal effect on mice infected with a laboratory strain of *T. rhodesiense*. Tests on rabbits in an advanced stage of infection with the same trypanosome were equally striking. Many of the compounds had some action on *T. congolense* infections in mice, but cures were obtained only with 4 : 4′-diamidino stilbene when given in maximum doses. None of the compounds had any effect on infections due to *T. cruzi*, *Spirochaeta recurrentis* or *Spirillum minus*, but some exhibited a marked activity against other protozoal infections, especially those due to *Leishmania* and *Babesia*. The maximum doses tolerated, and the toxic manifestations shown, by mice, cats, rabbits, dogs, cattle, sheep, and man are discussed.

II. Almost all the ten aromatic diamidine compounds tested had some influence on *Babesia canis* infection of young puppies in that the blood became negative after the infection. The drugs were injected subcutaneously about 24 hours after the parasites had appeared in the peripheral blood. Only three of the compounds exerted a definite curative effect; these were diamidino stilbene, diamidino diphenyl ether and diamidino diphenoxy propane.

It is shown that *B. canis* can readily be made resistant to these aromatic diamidines after the

administration of a few subcurative doses of one of them. This drug-resistance persisted unchanged after passage of the parasite through a number of puppies. These results indicate that it is hopeless to attempt to sterilize the infection by treatment of relapses with subcurative doses.

III. This note records the apparent cure of a case of Indian kala-azar by an aromatic diamidine, *viz*, 4 : 4′-diamidino stilbene.

IV. A report is given of the toxicity effects and the variations in the sugar and urea of the blood of normal fasting rabbits, after graded intravenous doses of 4 : 4′-diamidino stilbene. Successive small doses of 5 mg. per kg. were tolerated well, and no significant changes in blood sugar or urea were observed. Doses of 15 mg. per kg. were tolerated fairly well without alteration in the blood sugar, but a 50–100% increase in blood urea occurred. Higher doses (25 and 27·5 mg. per kg.) were tolerated with difficulty or proved fatal, and an increased and prolonged nitrogen retention occurred, accompanied by hyperglycaemia of relatively short duration.—R. Allcroft.

Nelson, Phyllis, M., & Tatum, A. L. (1938). **A Comparative Study of Various Agents in the Chemotherapy of Rat Trichomoniasis.**—*J. Pharmacol.* **63.** 122–142. 5 tables. [14 refs.]

The efficacy of 12 organic arsenicals and four other drugs—quinine, emetine, calomel and chiniofon, was tested by administering them to white rats by the oral, intramuscular, and intravenous routes. Using the therapeutic index (the ratio of the maximal tolerated dose to the minimal curative dose) as a criterion it was demonstrated that, for those drugs which cure by any of the routes tried, the oral route was far superior to the other two, and the intramuscular was superior to the intravenous route. Pentavalent arsenicals were found to be much more effective than trivalent, and five of the former compounds had favourable therapeutic indices when administered either intramuscularly or intravenously. The concentration of pentavalent arsenicals required to kill trichomonads *in vitro* was many times that required *in vivo*. Given orally, chiniofon was the only effective compound of the non-arsenicals, while after parenteral administration quinine, emetine and chiniofon were ineffective in eliminating trichomonads from the caeca of rats. *T. parva* infection did not seem to have any effect on the growth rate of young rats. The results of the chemotherapy trials indicated that some correlation exists between chemical structure and functional activity of the drugs used.—R. A.

Thomas, C. C., & Miller, Evelyn E. (1940). **Rotenone in the Treatment of Scabies. A New, Nonodorous, Nonirritating Form of Treatment. Preliminary Report.**—*Amer. J. med. Sci.* **199.** 670–674. 1 table. [5 refs.] [Abst. from authors' summary].

Rotenone, a constituent of derris root, has been effectively used as a parasiticide in veterinary medicine and agriculture. In the form of 1 or 2% lotions with a base similar to that of many hand lotions (quince seed, Irish moss), it produced prompt cure of human scabies in 24 unselected cases encountered in clinic and institutional practice. At the time treatment was begun, 6 of these patients presented most severe secondary pustular and dermatitic complications. The preparation is non-objectionable from the standpoint of odour and is non-irritating even to sensitive skins. Rotenone should be given a more extended trial in the treatment of scabies and other diseases due to external parasites.

Singer, A. J., & Baker, D. W. (1940). **Phenothiazine as an Anthelmintic for Intestinal Nematode Parasitisms in Sheep.**—*Cornell Vet.* **30.** 375–382. 2 tables. [8 refs.]

The authors confirm the reports made by other workers of the efficacy of phenothiazine as an anthelmintic for sheep. The drug was used as a suspension in mucilage of acacia (0·5 g. powdered gum acacia and 10 g. phenothiazine in 30 c.c.). In preliminary experiments 7 ewes were dosed three times at intervals of six days with 0·5 g. of the acacia suspension per lb. body weight. There was from 80–100% reduction in total egg count of all animals treated. No ill effects from the use of the drug were noted and there was an average increase in weight of 32 lb. In a further series of experiments the value of phenothiazine was compared with that of other anthelmintics. The data in the tables given indicate that phenothiazine is more efficient than tetrachlorethylene or $CuSO_4$—nicotine sulphate mixture, particularly against *Oesophagostomum*

columbianum, the nodular worm, a parasite which neither of these drugs affect. Phenothiazine seems to be particularly effective against *O. columbianum*, *Ostertagia ostertagi* and *Cooperia curticei*, less effective against *Nematodirus filicollis* and *Haemonchus contortus* and ineffective against *Trichostrongylus* spp., *Strongyloides* spp., and *Trichuris ovis*. It is stated that phenothiazine is more effective when the parasitic infestation is comparatively light.—J. A. G.

McNaught, J., Beard, R. R., & DeEds, F. (1939). **Effects of Sulfanilamide, Phenothiazine and Thionol in Experimental Trichinosis.**—*Proc. Soc. exp. Biol., N.Y.* **41.** 17–20. 1 table. [7 refs.]

The daily administration in the diet of 0·96 g. of sulphanilamide per kg. of body weight over a period of six weeks reduced the number of trichinae encysting in the muscles of rats by 55%. The continuous use of 0·25% phenothiazine in the food to total a dosage of one-tenth that of sulphanilamide reduced the severity of trichinous infection in rats by 74%, and warrants further experimentation. Thionol is of little value.—J. M. Robson.

McNaught, J. B., Beard, R. R., & DeEds, F. (1939). **Further Observations on Phenothiazine in Experimental Trichinosis.** —*Proc. Soc. exp. Biol., N.Y.* **42.** 645–648. 1 table. [4 refs.]

From further experiments [see preceding abstract], the authors concluded that phenothiazine administered prior to, concurrent with, or after infestation has no appreciable value in experimental trichinosis of rats. There is strong evidence of a sex variation in the susceptibility of rats to trichinosis, females having higher resistance as indicated by the number of encysted *Trichinella* found after feeding standard doses of larvae.—J. A. G.

Bronfenbrenner, J., & Sulkin, S. E. (1939). **Bacteriophage Therapy. I. Effect of Bacteriophage on Cutaneous Staphylococcus Lesions in Rabbits. II. Prophylactic and Therapeutic Effect of Bacteriophage and of Antivirus in Experimental Infections of the Eye. III. On the Nature of the Deleterious Effect of the Local Application of Staphylococcus Bacteriophage.** — *J. infect. Dis.* **65.** 53–72. 6 figs. [Numerous refs.]

I. After a suspension of a moderately invasive strain of *Staphylococcus* had been injected into both flanks of rabbits, the animals were treated with bacteriophage, by local application to the surface of the lesion, by direct injection into the lesion or intravenously. In all the experiments the injected sites on the left flank served as controls, receiving sterile broth instead of bacteriophage. The results showed that when bacteria and bacteriophage were injected simultaneously, immediately after combining them, there was a marked decrease in the size of the resultant lesion and healing progressed rapidly. But a definite temporary intensification of the local reaction was produced by the immediate application of bacteriophage to the lesion.

It is concluded that bacteriophage applied locally in the form of wet dressings, or injected intravenously is of no therapeutic value in the treatment of staphylococcal skin infection in experimentally infected animals.

II. Lesions were produced in the eyes of albino rabbits and g. pigs by injecting a suspension of *Staphylococcus* into the cornea or anterior chamber; the left eye of each animal was used as a control, receiving sterile broth instead of bacteriophage or antivirus. In no case was the infection prevented by instillations of antivirus or bacteriophage, nor was any difference observed in the duration of the reaction beyond that which could be ascribed to individual differences in the animals. Direct application of bacteriophage or antivirus was of no therapeutic value and frequently produced an intensification of the local reaction.

III. Experiments were carried out to determine whether the deleterious effects of the bacteriophage therapy reported in I and II were due to the presence of the "spreading factor." The results showed that the temporary intensification of the local reaction produced by the application of bacteriophage lysates was due to the presence of thermostable "Reynals spreading factor" in bacteriophage preparations obtained with highly invasive strains of *Staphylococcus*, but that bacteriophage propagated on non-invasive strains did not cause intensification of the reaction. It is suggested, therefore, that unfavourable reactions can be prevented by careful selection of the strains used in the preparation of the bacteriophage.

—R. Allcroft.

POISONS AND POISONING

EDEN, A. (1940). **Observations on Copper Poisoning.**—*J. comp. Path.* **53.** 90–111. 9 tables. [Numerous refs.]

The Cu content of the tissues of normal adult rabbits and sheep lies between 0·1 and 0·5 mg. %, except for sheep's liver which ranges from 0·2–29 mg. % without any evidence of associated pathological change. The greater proportion of values is under 2 mg. per 100 g. In acute Cu poisoning the principal changes in the Cu content of tissues lie in greatly increased values for liver and kidney. Owing to the wide range of liver Cu values, diagnosis depends upon a combination of clinical symptoms, circumstantial evidence, and P.M. findings, with confirmatory analytical evidence.

Attempts to induce chronic intoxication in rabbits by feeding $CuSO_4$ dried on food were unsuccessful, although evidence of considerable Cu storage in the liver was obtained. In sheep, chronic poisoning developed in from 30–80 days when 1·5 g. $CuSO_4$ were given daily in the form of a drench or damped on to a palatable mixture of concentrates. The main features of chronic poisoning appear to be (a) relatively limited absorption from the intestinal tract even when the copper intake is high; (b) adequate elimination of absorbed Cu in bile and urine with limited storage, particularly in the liver, so that blood Cu does not rise materially in the early stages; (c) gradual functional damage particularly to the liver and kidneys with slowly rising blood Cu, and (d) sudden breakdown of eliminative mechanisms with a sharp pre-mortal rise of blood copper. The invalidity of diagnosis of Cu poisoning by liver analysis *per se* is emphasized.—R. BAMFORD.

LILLIE, R. D., & SMITH, M. I. (1940). **Histogenesis of Hepatic Cirrhosis in Chronic Food Selenosis.**—*Amer. J. Path.* **16.** 223–228. 4 figs. on 2 plates. [6 refs.]

After stated intervals of time, tissues were examined from rats fed on a seleniferous, low protein, high carbohydrate diet. The most characteristic features were well-marked nodular cirrhosis of the liver with ascites and anaemia. Other lesions found included a considerable amount of cellular destruction and phagocytosis of nuclear debris in the follicles of the spleen and a moderate splenic myelosis. Other seleniferous diets fed to different groups of rats were high protein, and low protein with high fat [see also *V. B.* **10.** 129]. Delay in the production of symptoms and some, but not complete, protection were obtained by these diets.

In the histogenesis of this cirrhosis associated with food Se poisoning in rats, organizing haemorrhage is a frequent possibly essential stage. The destructive process is continuous as shown by the presence of scattered and isolated necrotic liver cells and of the hyaline, oxyphilic globules derived from them in all the later stages in the process.—ALFRED EDEN.

VIANELLO, G. (1940). Un avvelenamento da naftalina nei cavalli. [**Naphthalene Poisoning in Horses**].—*Clin. vet., Milano.* **63.** 105–109. 1 fig. [5 refs.]

Naphthalene used for the treatment of eczema was administered *per os* in error instead of a purgative. One horse died and three more were slaughtered *in extremis*. The dose administered was not more than 50–60 g. It is stated that horses are highly sensitive to naphthalene, naphthol, and benzonaphthol poisoning.
—E. MARTIN.

BROCQ-ROUSSEAU, D., ROUSSEL, G., & VERGE, J. (1939). Les injections intra-veineuses d'histamine chex le cheval et chez le chien. [**The Toxicity of Intravenous Injections of Histamine into Horses and Dogs**].—*C. R. Soc. Biol. Paris.* **132.** 446–447.

Histamine in solution with physiological serum was injected intravenously. The symptoms leading to death from severe shock are described; the M.L.D. per kg. body weight was 0·5–1·0 mg. for the horse, and about 10 mg. for the dog.—R. BAMFORD.

POLYAKOV, D. P. (1940). Otravlenie skota bobovnikom (Dikim Persikom). [**Poisoning of Cattle with "Wild Peach"** (*Amygdalus nana*)].—*Sovyet. Vet.* No. 4. p. 59.

Deaths occurring among grazing cattle in the Ukraine and South Russia were traced to *Amygdalus nana*, hitherto not regarded as poisonous. Chemical analysis of the leaves revealed the presence of cyanogenetic substances in considerable quantities.—E. MARTIN.

NIKOL'SKIĬ, M. N. (1940). Otravlenie svineĭ varenoĭ svekloĭ. [**Poisoning of Pigs with Boiled Swedes**].—*Sovyet. Vet.* No. 4. pp. 58–59.

Sudden deaths among pigs during the winter months 1–2 hours after feeding were found to be due to poisoning by nitrates contained in the boiled turnips with which they were fed and which had been grown on nitrated ground. Raw turnips were harmless and turnips grown without artificial manure were less poisonous than those on which a chemical nitrate fertilizer had been used.—E. MARTIN.

ANDREEV, N. G. (1940). Muretsiya zheltaya (Muretia lutea) kak yadovitoe rastenie. [*Muretia lutea*, **a Poisonous Plant**].—*Sovyet. Vet.* No. 4. p. 60. 1 fig. [1 ref.]

M. lutea, an umbelliferous plant was found to cause fatal poisoning in sheep and cattle, either in the flowering stage or dried in hay. Seeds of the plant inadvertently ground into flour together with rye in 1934, caused poisoning in human beings.—E. MARTIN.

PHYSIOLOGY

GERMAN, V. A. (1940). Vliyanie vegetativnoĭ nervnoĭ sistemy na sostav periphericheskoĭ krovi loshadi. [**Influence of the Autonomic Nervous System on the Composition of the Peripheral Blood in Horses**].—*Sovyet. Vet.* No. 4. pp. 66–68.

Stimulation of peripheral sections of the autonomic nervous system in the region of the 5th–6th cervical vertebrae made no change in the isohaemo-agglutination titre of the serum. Changes in the morphological composition of the blood were effected as follows :– (a) stimulation of the vagus induced a reduction in the number of thrombocytes and an increase of eosinophiles and lymphocytes ; (b) stimulation of the sympathetic induced an increase of segmented neutrophiles and monocytes, a slight decrease of lymphocytes and eosinophiles, and in some, but not all cases, an increase of thrombocytes.

Vagus stimulation decreased and sympathetic stimulation increased the viscosity of the blood. Chemical changes were also observed :– (a) the blood sugar was increased and the alkaline reserve slightly increased by stimulation of the vagus, while both were decreased by stimulation of the sympathetic ; (b) the calcium level and the proportion of oxidized to reconstituted glutathione were lowered on vagus stimulation and increased on sympathetic stimulation.

Horse blood collected immediately after stimulation of the vagus and passed through the isolated heart of a rabbit induced a sudden slowing down of the beat. The reverse reaction was obtained with blood collected after sympathetic stimulation. Horse blood collected immediately after stimulation of the vagus and transfused into a dog induced a sudden fall in blood pressure, while blood collected after sympathetic stimulation had the reverse effect. On stimulation of the vagus in the horse, acetone appeared in the urine. No such reaction was observed on stimulation of the sympathetic.

The authors express the opinion that stimulation of the autonomic nervous system leads to the formation of a specific active substance in the blood which is capable of influencing a number of biological processes occurring in the organism.—E. MARTIN.

MANRESA, M., REYES, N. C., GOMEZ, F., ZIALCITA, L. P., & FALCON, P. R. (1940). **The Influence of Atmospheric Temperature upon Haemoglobin and other Constituents of the Blood of Cattle.**—*Emp. J. exp. Agric.* **8.** 97–100. [14 refs.]

By means of haematological studies, attempts were made to discover why pure-bred livestock from temperate countries failed to stand up to the tropical conditions of the Philippines. The native cattle had higher Hb levels than imported stock, and a negative correlation was found between Hb index and daily variations in atmospheric temperature while Hb levels rose during the cooler months. Imported breeds also ran a higher body temperature. Hb levels, red blood cell counts, blood specific gravity, and the P : Ca ratio of the blood serum bore a direct positive relationship to the ability of the animals to adapt themselves to temperature conditions. It is concluded that air temperature and, to a lesser degree, the humidity, is the limiting environmental factor for the successful raising of imported breeds of cattle.—A. EDEN.

KEDAR, N. D., SINGH, M., & RAO, G. (1940). **Observations on the Physiological Constituents of Equine Blood.**—*Indian J. vet. Sci.* **10.** 88–93. 4 tables. [Numerous refs.]

Analyses are given of various chemical constituents of the blood of 14 apparently healthy, good-sized horses in India, and the results are compared with those of various other authors,

The summarized figures of the present findings are :–

	Mg. % Blood			*Mg. % Serum*						
	Sugar	Chlorides	Preformed Creatinine	Creatinine + Creatine	Ca	Inorganic P	Total Cholesterol			
Mean	74·8	306	1·53	4·34	14·07	3·01	147·9			
Range	66·5–83·5	290–320	1·42–1·79	4·02–4·69	12·0–16·0	2·12–3·80	120·3–195·2			
				Mg. % Serum						
	Total Protein	Euglobulin	Pseudo-globulin I	Pseudo-globulin II	Total Globulins	Albumin	Albumin : Globulin Ratio			
Mean	8·30	1·02	1·53	1·09	3·66	4·64	1·26			
Range	7·35–9·21	0·78–1·28	1·09–1·90	0·97–1·58	3·15–3·90	3·72–4·90	1·02–1·42			

—Alfred Eden.

Bertagni, P. (1940). Variazioni del contenuto in ferro nel fegato e nella milza di feti bovini di diversa età. [**Variations in the Iron Content of the Liver and Spleen in Bovine Foetuses**].—*Biochim. Terap. sper.* **27.** 45–49. 2 tables, 1 graph. [2 refs.] [English, French and German summaries].

The iron content of the liver was determined in 14 bovine foetuses, aged from 2–7½ months, and the iron content of the spleen in six foetuses aged from 4½–7½ months. It was found that the iron content of the liver increased progressively except from the 4th–6th month, when it showed a slight decrease, minimum values being observed at 5½ months. The explanation offered for this is that iron from the liver is transferred to the bone-marrow when the haemopoietic function of that organ begins at 4½ months. The exceptionally rapid growth of the liver itself between the 4th and 6th months may serve as a further explanation. The iron content of the spleen was found to be higher than that of the liver.—E. Martin.

Luquin, R. (1939). Le sang du chien. [**The Blood of the Dog**].—*Thesis, Alfort.* pp. 151. 46 tables, 1 graph, 1 chart. [Numerous refs.]

The amount of original material supplied in this thesis is very small, but L. has assembled in tabular form a vast amount of data from the literature on various physical, haematological and chemical attributes of the blood of the dog. Valuable information on a large number of points is included. Most attention is given to various aspects of haematology on which a few original observations have been made, and comparatively the chemical information is scanty. Anyone specially interested in a study of this subject will discover some very useful material here and will find, concisely assembled, data which otherwise might only be available after laborious searching of the literature.

—Alfred Eden.

Anderson, H. D., & Elvehjem, C. A. (1940). **Variations in the Blood Calcium and Phosphorus with the Age of the Dog.**—*J. biol. Chem.* **134.** 217–223. 3 figs., 2 tables. [6 refs.]

Studies of the Ca and inorganic P content of the blood of dogs maintained on a diet of whole milk supplemented with Fe, Mn, and Cu were made over a period of two years. The P values decreased progressively throughout the growing period. A mild vitamin D deficiency was corrected by the addition of cod liver oil, leading to a rise in blood inorganic P and a fall in the Ca. The Ca values were highly variable but showed an ultimate downward trend during the period of maturation. The only apparent correlation was a sharp rise in blood Ca at times when the inorganic P showed a sharp fall. Other rations were used including commercial feeds, but the same general trends were found, supporting the findings of other investigators

working on different species. [The analyses were made on trichloracetic acid filtrates of whole blood without any attempt at preventing enzyme action. The authors admit this, but give a table showing the extent of phosphorolysis over a period of 24 hours and since all analyses were made within three hours of withdrawal of blood they claim their figures to be accurate within 5%. They also state that the whole blood Ca and P figures can be converted into approximately corresponding ones for serum by multiplying by the factor 1·4.]

—Alfred Eden.

Logan, M. A., & O'Connor, P. (1939). **The Early Effects of Parathyroid Hormone on the Blood and Urine.**—*J. biol. Chem.* **127.** 711–719. 5 figs., 1 table. [14 refs.]

Various amounts of parathyroid hormone were given subcutaneously or intravenously to fasted young dogs. Samples of urine secured each hour by catheterization were analysed for total N, total base, Cl, P and Ca whilst the serum Ca and inorganic P were simultaneously determined. It was found that the excreted urinary P increases and the serum P usually decreases during the first hour after the administration of the hormone. This active excretion of P by the kidney appears to be one of the first effects of excess of the hormone. The Ca excretion increases some hours later following the elevation of serum Ca. Since the serum Ca immediately began to rise following injection, whether or not the P decreased, the authors suggest that it is reasonable to suppose that active solution of bone also occurred over the first hour.—Alfred Eden.

Fenn, W. O. (1940). **The Rôle of Potassium in Physiological Processes.**—*Physiol. Rev.* **20.** 377–415. [Numerous refs.]

K is relatively abundant in all living cells and forms an essential part of their physico-chemical structure. In contrast to Na cell walls are very permeable to K ions. The role of K in the cell sap has been further elucidated by the use of radioactive K. The balance of the metal in the body is discussed and the effects of deficiency are considered, especially in relation to the effect on Na metabolism. Consideration is given to the fate of ingested and injected K and also to tonic levels and effects. K plays an active part in growth and a significant role in muscular contraction. There is a loss of K during activity of other excitable tissues, and the metal plays an important part, along with acetylcholine, in neuro-muscular transmission. In various muscular disorders injected K has an important therapeutic value. Injection of K further causes an increase in adrenalin secretion and a widespread parallelism between K and adrenalin has been recorded in relation to various physiological effects. In asphyxia, haemorrhage and shock there is a liberation of K from all tissues, in particular, the liver, resulting in a rise in plasma K. The effects of adrenal insufficiency upon K metabolism are discussed. The relationship of K to carbohydrate metabolism, nerve and muscle functions are considered and there is a discussion of the physiological state of K in the blood and of the blood K changes under various conditions. The antagonistic functions of K and Ca are such that together they play an important role in nearly every vital process.

—Alfred Eden.

Salter, W. T. (1940). **Fluctuations in Body Iodine.**—*Physiol. Rev.* **20.** 345–376. 2 figs., 1 table. [Numerous refs.]

The distribution of I as iodide and organically combined I in the body is discussed. The muscles may contain up to one-half of the total body I, but the highest concentration per unit mass is in the thyroid gland. Although most body fluids contain free iodide, the naturally occurring organic compounds thyroxine and diiodotyrosine are physiologically more important. After administration of I from an external source it is stored as iodide in most body tissues and organically combined in the skin, muscles, liver and thyroid. The occurrence of I in respired air, cerebrospinal fluid, and lymph, milk, sweat and saliva is discussed. The physiological range of blood I, until recently erroneously given owing to imperfect analytical procedures, now appears to vary from 3–20 μg. %, but is subject to fluctuations depending on the I intake. Attempts to fractionate the blood I have been only partially successful and the separation of organic from inorganic I appears to depend largely upon the type of analytical procedure employed. A suggested scheme of fractionation is given. The effects of exercise, administration of I compounds, simple iodides and thyroxine upon the blood I level are discussed as well as the relation of blood I to the basal metabolic rate. Various aspects of thyroid activity are considered, although discussion of the gland, and its chemistry and physiology are omitted, and the manufacture of the hormone and its calorigenic activity in

various forms are dealt with fully. Of the physiological excretion of I, the urine is the principal channel with the faeces very subsidiary, although the administration of I compounds, both organic and inorganic, exercise, and other factors all play an important part in determining the channels of elimination; excretion may also occur through the milk, sweat and saliva. The fasting I excretion is also considered.—ALFRED EDEN.

OTTO, J. S. (1938). **The Assimilation of Calcium and Phosphorus by the Growing Bovine.**—*Onderstepoort J. vet. Sci.* **10.** 281–364. 2 figs., 51 tables. [Num. refs.]

Young growing bovines weighing about 500 lb. were fed basal rations supplying only 1·0–2·4 g. P and 2·0–2·8 g. Ca per day, but adequate in respect of NaCl and vitamins. At regular intervals the rations were supplemented with different commercial phosphates and calcium carbonate in such a way as to vary the total daily intake at a constant Ca/P ratio of about 2 : 1.

Balance experiments showed that 10·5 g. P and 23 g. Ca permitted an average daily retention in the body of about 6·6 g. P and 9·7 g. Ca. In long duration experiments rations containing 8·5 g. P and 16·4 g. Ca were found adequate for growing steers, whereas 6 g. P associated with 12 g. Ca was insufficient.

Expressed on a percentage basis, retention was highest at levels of P below actual requirements. Taking percentage retention as a measure of availability, the soluble disodium phosphate appeared to be more readily utilized than the relatively insoluble dicalcium phosphate and bone meal, but at very low levels of intake all three appeared to be almost wholly available (100%, 97%, 94% respectively).

Variation of the intake of either Ca or P from the optimum resulted in less efficient retention of both elements, insufficiency of one element limiting the retention of the other.

The percentage of ash in the green bones of animals killed at the end of the experiment afforded an excellent index of the degree of calcification, and for animals of the same age a close correlation was noted between ash content and breaking strength of the metacarpus.

—E. M. ROBINSON.

TOMPSETT, S. L. (1940). **Factors Influencing Absorption of Iron and Copper from the Alimentary Tract.**—*Biochem. J.* **34.** 961–969. 4 tables. [Numerous refs.]

Experiments were made to determine the extent of dialysis of ferrous and ferric Fe, Cu and Pb in the presence of various foodstuffs. The dialysis of ferric, but not ferrous, Fe was inhibited by phosphoproteins and phosphatides. Ferric Fe may be reduced by certain foodstuffs especially at an acid reaction, and ferrous Fe appears to be the only form of Fe absorbable from the alimentary tract. In the presence of egg yolk ferrous Fe is readily oxidized to the ferric state. In experiments on mice, the absorption of dietary Fe from the alimentary tract is influenced by (1) the gastric acidity, (2) the Ca content of the diet, and (3) the oxidation-reduction potential of the stomach contents. Absorption of both Fe and Cu is higher on a low Ca diet than on high Ca, and is increased by the addition of acid to the diet. These results are discussed in relation to various factors involved in human nutrition. The absorption of dietary Fe must be influenced by other factors in the diet. The therapeutic value of ferric salts in the treatment of hypochromic anaemias is explained as being "probably due to the fact that only a part is converted into non-dissociated colloidal complexes. Under such conditions, the possibility should not be overlooked that ferric Fe may be absorbed as such."—ALFRED EDEN.

TECHNIQUE AND APPARATUS

SARTORY, A., MEYER, J., & SCHMUTZ, D. (1938). De l'influence favorisant la croissance bactérienne par l'introduction préalable des vitamines B_1 et B_2 combinées et à doses variées, dans le milieu de culture. [**Influence on Bacterial Growth of the Addition of Vitamins B_1 and B_2 to the Culture Media**].—*C. R. Acad. Sci., Paris.* **207.** 1262–1263. [2 refs.]

Addition to the media of vitamins B_1 and B_2 together in amounts varying from 0·005–5 μg. exerted on the whole, a favourable influence on bacterial growth. A slightly inhibitory action was noted only on the third day when very small amounts were used. The addition of 5 μg. of vitamin B_2 with varying amounts of vitamin B_1 produced optimum bacterial growth on the third day. In previous experiments, however, it was found that vitamin B_2 used alone had

no effect except in amounts less than 0·05 μg. It is concluded that vitamin B_1 is the principal activator and that vitamin B_2 exerts a maximum influence only when used together with vitamin B_1.

DE MENDONÇA MACHADO, A. (1938). Ensaios comparativos acêrca da cultura do M. Tuberculosis. [**Culture of *Mycobacterium tuberculosis***].—*Repos. Lab. Pat. vet., Lisboa.* **3.** 211–219. 4 tables. [11 refs.] [English and French summaries].

The author compared the value of the antiformin and Löwenstein's sulphuric acid methods of *M. tuberculosis* culture. Hohn's modification of Löwenstein's medium was used in some instances. Hohn's medium was the best for bovine type bacilli and Hohn's and Petragnani's media for the avian type. Herrold's egg-agar medium gave good results with both the bovine and avian types. A humid incubator with a temperature of 34–36°C. was necessary with the latter medium. —MILLER WATSON.

ZINK, A. (1939). Beitrag zur Frage der Sterilhaltung von Heilseren. I. Untersuchung über den Wert der gebräuchlichsten Konservierungsmittel. [**Sterilization and Conservation of Antisera. I. The Value of the Common Preservatives**].—*Zbl. Bakt. I.* (*Orig.*). **144.** 450–457. 7 tables. [Translation of author's summary].

Phenol, chinosol, nipasol and merthiolate were tested for their injurious effect when added to sera for preservative purposes.

Phenol was found to be a very unsuitable and very toxic preservative. Nipasol was little better, whilst chinosol and, above all, merthiolate, gave the best results.

HANKS, J. H., & JAMES, D. F. (1940). **The Enumeration of Bacteria by the Microscopic Count.**—*J. Bact.* **39.** 297–305. 4 figs. [2 refs.]

It has been shown that the natural distribution of bacteria in films prepared for microscopic counting is not taken into consideration when counts are made at random or by orderly movements along parallel lines. Preparation of circular films and microscopic sampling along two diameters at right angles takes into account the concentric distribution of bacteria and minimizes the effect of abnormal distribution.

The production of reliable bacterial counts necessitated the use of a suitable fixative, the composition of which is given. The amount of this fixative required on a given slide area was 0·005–0·01 ml.; this amount caused no significant difference in the counts. The results suggest that certain minimum standards must be met in order to obtain reliable agreement of estimates of the total count under ideal conditions. If it is assumed that the counting of bacteria in duplicate films will reduce by one-half the number of fields to be examined in each film, at least 22 fields should be counted in a film containing an average of 6–20 bacteria per field. In the presence of 20 or more bacteria per field, 11 fields per film should be accepted. —S. J. EDWARDS.

LEROUX, R. (1938). L'examen histologique extemporané. Technique de l'ultropak. [**Immediate Histological Examination by the Ultrapak**].—*Bull. Ass. franç. Cancer.* **27.** 673–678. 4 figs. [Abst. in *Amer. J. Cancer.* **36.** 140–141, copied *verbatim*. Signed: L. FOULDS].

Leroux describes the preparation of fresh and fixed tissues for examination by the ultrapak and the apparatus required. This is the method of choice for the immediate examination of tissues during operation and for rapid diagnosis during autopsies. For details reference should be made to the original. Photographs of the apparatus are included.

SEIFRIED, O. (1939). Neuzeitliche Sammlung und Ordnung histologischer Schnitte. [**Collection and Arrangement of Histological Sections**].—*Arch. wiss. prakt. Tierheilk.* **74.** 402–405. 2 figs.

By the method described slides are stored in a case which is shaped like an incubator and contains a tier of drawers. Across each drawer are a number of "suspension rods" attached to small sheets of cardboard, to each of which are fixed ten slit pockets. The slide is placed vertically in a pocket and labelled on the outside. The rods are labelled with the name of the organ from which the sections were taken, and, if more than one rod is employed for sections from the same organ, all are painted with the same colour.—C. W. OTTAWAY.

SIMONS, H. (1938). Mise en évidence des protozoaires et des spirochetes sanguicoles, en goutte épaisse, en présence d'hématies nucléées, par le taurocholate de bleu de méthylène. [**Demonstration**

by Methylene Blue Taurocholate of Protozoa and Blood Spirochaetes in Thick Blood Smears Prepared from Animals with Nucleated Erythrocytes]. —*Ann. Parasit. hum. comp.* **16.** 254–258. [2 refs.]

The demonstration of plasmodia in thick blood smears containing nucleated red cells is facilitated by staining with a mixture of sodium taurocholate and methylene blue. The cytoplasm of the parasite stains intense blue, whilst the nucleus is unstained, and the red cell nuclei and leucocytic cytoplasm stain pale blue or are colourless. Four methods are described which are also applicable to trypanosomes and spirochaetes.—M. L. Bingham.

Swartzwelder, J. C. (1939). **A Comparison of Five Laboratory Techniques for the Demonstration of Intestinal Parasites.**—*J. trop. Med.* (*Hyg.*). **42.** 185–187. 2 figs., 1 plate. [4 refs.]

Each faecal sample was examined by the following methods:–(1) direct smear; (2) centrifugal concentration; (3) zinc sulphate centrifugal flotation; (4) brine (direct) centrifugal flotation, and (5) sedimentation, in order to determine the comparative value of each method for the routine diagnosis of intestinal parasites in man. No single method detected all of the infections, but the zinc sulphate technique revealed the largest number of both protozoan and helminth infections [see also *V. B.* **10.** 394]. Methods (4) and (5) were equally efficient in the detection of helminth eggs, but (4) failed to isolate any protozoa.

—M. L. Bingham.

MISCELLANEOUS

Lakoza, I. I. [Edited by]. (1938). Verblyudovodstvo v SSSR. [**Camel Breeding in the U. S. S. R.**] pp. 280. Numerous figs., tables, maps. Moscow: Selkhozgiz. [8vo] [2 roubles] [10s.]

This book is a collection of papers by 12 authors. The introductory article gives a survey of the methods by which an approximate census of the camel population of the U.S.S.R. was taken and outlines the plans for an improvement of the aboriginal breeds which have remained practically unchanged for about 5,000 years. Eight papers contain descriptions of the various Bactrian and dromedary breeds now in existence in the Russian Union. A chapter is devoted to the biological and economic characteristics of the various Bactrian-dromedary hybrids, and their numbers in the different areas. A paper on the geographical incidence of the various breeds and strains of camels in the U.S.S.R. and one on the principles of selection which govern the breeding experiments now in progress conclude the book.

—E. Martin.

Rossi, P. (1937). Rapport de mission au Mexique. [**Report of a Journey to Mexico**].—*Bull. Soc. Sci. vét. Lyon.* **40.** 83–100 and 120–143.

The primary object of the journey was to encourage the exportation of breeding stock from France to Mexico which had been started in 1929 but which had been stopped by the world economic crisis and the rigorous interpretation of the Mexico-United States Convention of 1930.

The object and successful result of the journey are discussed. Observations are made on the state of the animals previously imported from France, on the meat trade, on the methods of handling milk, and on sheep, pig, and horse husbandry in Mexico, as well as on veterinary education in that country. The scientific institutions of the country and the work done therein are also described.

It was found that Charollais cattle had proved themselves to be eminently suitable for conditions in Mexico and that no deterioration in the breed need occur there. Of the country's requirements of pig products, 30%, mostly in the form of cooking fat, was obtained from the United States and the Low Countries. Swine disease was rampant. Practically all fine wool had to be imported. Excellent horses were available, but it was necessary to import foreign blood to maintain the standard.

The report indicates in what direction French influence might be extended.—G. W.

Noriega, C. N. (1939). Contribución al estudio de la legislación veterinaria en Colombia. [**Contribution to the Study of Veterinary Legislation in Colombia**]. —*Rev. Med. vet., Bogotá.* **9.** 113–246.

The object of the article is to promote the revision of existing legislation relating to veterinary sanitary science in Colombia. Legislation on almost every point exists, but it is out

of date and, as it is not codified, it is difficult to consult.

The subject is dealt with under the following headings :– inspection of food of animal origin, sanitary service relating to cattle at the ports and at the frontiers, sanitary police, various regulations affecting the veterinary profession, those which prohibit the slaughter of cows, and some others.

Laws and decrees regarding meat inspection made from 1906 to 1936 are given in detail. They refer to the health of the animals, the defects which render them unfit for human consumption, the hygiene of the abattoirs etc., organization for inspection, duties and powers of vetérinary inspectors, seizure of carcasses, conservation of food, official seals, certificates of fitness for exportation, fines, etc. The laws are criticized and amendments suggested. Such points as the advisability of differentiating the physiological and pathological causes of leanness of carcass, the one resulting in lessened nutritive value and the other in a potential danger to health, are discussed, as are also the regulations governing the condemnation of tuberculous carcasses. A compilation of the legislation referring to the sanitary-police measures dealing with livestock from 1914 to 1935 is given and a number of observations are made. It is pointed out that the laws concerning rabies, tuberculosis, and milk are quite inadequate. New laws dealing with these subjects are proposed. Regulations in relation to the import and export of cattle are collated and a projected decree to improve them is submitted, *e.g.* it is suggested that all animals imported should be subjected to the diagnostic procedures imposed upon those which are exported.

The laws under all heads are capitulated in some detail.—G. Williamson.

Stordy, R. J. (1939). **Air Raid Protective Devices for Animals.**—*Vet. Rec.* **51.** 1059–1061. 2 photographs.

A brief talk on certain methods of aerial attack and some methods of protection, illustrated by models, diagrams, and photographs, which was given at a congress of the National Veterinary Medical Association.

Control devices for the larger animals and a first-aid haversack were exhibited.—H. E. B.

—. (1940). **National A.R.P. for Animals. Scheme for Rural Areas.**—*Vet. Rec.* **52.** 413–415.

Objects of the scheme are the first-aid treatment of farm animals, the salvage of seriously injured food animals, the disposal of carcasses unfit for human consumption, the protection of the public from animals at large, and the application of anti-gas measures for animals and carcasses.

Personnel, which is voluntary, consists of county and divisional veterinary officers and divisional and parish animal stewards, together with slaughtermen and other helpers.

The farmer notifies the police or the A.R.P. post. The message is transmitted by the A.R.P. control room to the responsible officers. The parish animal steward then proceeds to the farm with his squad—butcher and helpers.

Liaison is maintained with regional abattoirs for slaughter and reception of carcasses.

—H. E. Bywater.

Balfour, Eve B. (1940). **The Haughley Research Farms. Proposal for an Experiment in Soil Fertility in Its Relationship to Health.**—pp. ix + 53. 1 diagram, 2 appendixes. [16 refs.] Haughley, Suffolk : Haughley Research Farms. [4to].

This brochure is intended to secure public interest and support for the long-term experiment it describes. It opens with very favourable forewords from persons eminent in medicine and in public affairs, and is thereafter divided into two parts.

Part I is entitled " Soil Fertility and Health ". It comprises a popular exposition of the results claimed by McCarrison in the field of human and animal nutrition, and by Howard in his studies which have led to the development of the Indore process of humus manufacture and to the part played by the mycorrhiza in the nutrition of certain plants. It is held that these findings are closely linked, the thesis being that crops grown on land treated with humus will far exceed in real quality those from artificially-dressed land, and that the difference will manifest itself not only in the disease-resisting powers of the crops themselves, but also in the health of the animals and persons fed from the crops. There are fairly extensive quotations from Howard's publications, as well as from elsewhere, but the general tone is somewhat unfortunate and the vitalistic implications are likely to prove aggravating to the majority of scientific readers.

In part II, the proposed experiment is described. Two adjacent Suffolk farm hold-

ings, together comprising 286 acres, are available should sufficient support for the scheme be forthcoming, and the plan is to divide this land into two approximately equal units. Each unit is to be sown with the same variety of crops, to carry the same head of stock, and as far as possible to be subjected to the same systems of cultivation and rotation. Both units are to be dressed with lime where necessary, but otherwise one unit is to receive only humus prepared according to the Indore process, whereas the other unit is to be treated with complete dressings of artificial fertilizers and is to receive its only supply of organic matter from the ploughing-in of green crops.

It is stated that careful scientific interpretation would be given to the results obtained on the two units, but a cursory description only is given of the nature of the intended observations. The livestock on each unit would be maintained as far as possible on the produce of that unit, and in their case " . . . it will be necessary to take a selection of animals from each unit, to buildings specially set aside for the purpose, where diseased stock from outside sources will be introduced among them, and any difference in power to resist natural infection carefully noted and recorded ".

Should the quality of the crops and stock differ as predicted in part I, it is proposed to carry out tests of the dietary value of the respective farm produce upon families and institutions.—ALASTAIR N. WORDEN.

SIMON, L. S. (1940). O biologicheskom obezvrezhivanii navoza. [**Biological Disinfection of Manure**].—*Sovyet. Vet.* No. 4. pp. 41–47.

Experiences are described on the disinfecting effect on manure of the maturing process. The importance of sufficient humidity is stressed, especially in the peripheral portion of the manure heap, and a procedure described by which maturing can be induced even in very cold weather.—E. MARTIN.

BLUMENTHAL, H. T. (1939). **Effects of Organismal Differentials on the Distribution of Leukocytes in the Circulating Blood.**—*Arch. Path.* **27.** 510–545. 15 tables. [Numerous refs.]

The author defines organismal differentials as comprising all the various differentials peculiar to individuals, species, orders and classes of the higher animals. For example, each individual organism is assumed to possess a chemical characteristic common to all its tissues and organs and differentiating it from all other individuals of the same species. These chemical peculiarities which distinguish individuals are termed individuality differentials. Organismal differentials are thus the sum total of individuality, specific, generic and class differentials.

Several hundred transplantation experiments (grafts), using a wide variety of tissues, were made on g. pigs, rats, pigeons and chickens, to determine the differences produced in the systematic reaction to the grafts as represented by changes in the differential and total blood cell count. Each piece of transplanted tissue, similar in size to a single lobe of rat thyroid, was grafted into a subcutaneous pocket, or multiple pieces were grafted simultaneously or in succession. At intervals before and after transplantation, differential white blood cell counts were made. Autogenous, syngenesious (between sibs), homogenous and heterogenous types of grafting are defined and their effects compared. B. concluded from these results that hormone-like substances, probably of a protein nature and bearing the organismal differentials, diffused from the grafted tissues not only into the areas directly around the graft but to the leucocyte-producing tissues, thereby affecting the number and kind of leucocytes in the general circulation.

A study was also made of the effects of temperature and of various chemical substances on the individuality and species differentials contained in grafted tissues.—R. O. MUIR.

LITTLE, R. B., & MINETT, F. C. (1939). **The Classification of the Streptococci of Bovine Mastitis.**—*Vet. Rec.* **51.** 637. [Also appeared in *J. Amer. vet. med. Ass.* **95.** 43–44. (1939); *Aust. vet. J.* **15.** 133. (1939); *Lait.* **19.** 669–670. (1939); *Rec. Méd. vet.* **115.** 383. (1939); *Berl. Münch. tierärtzl. Wschr.* July 14th. 440. (1939); *Dtsch. tierärtzl. Wschr.* **47.** 410. (1939); *Z. Fleisch.- u. Milchhyg.* **49.** 372–373. (1939); *Tierärtzl. Rdsch.* **45.** 515–516. (1939), and *Skand. VetTidskr.* **29.** 586–588. (1939)].

This is a project, the aim of which is to secure uniformity in nomenclature of the streptococci which cause bovine mastitis. The note is published in the journals named and interested workers are invited to adhere.

OFFICIAL AND OTHER REPORTS

TUNISIA. (1938). Rapport du chef du service de l'élevage pour l'année 1937. [**Report of the Livestock Service for 1937**].—*Bull. Off. internat. Epiz.* **17.** 25–29.

The most important occurrence of the year was the outbreak of FOOT AND MOUTH DISEASE; it was apparently imported from Algeria, in spite of the regulations framed to prevent crossing of the border; the regulations, in fact, merely delayed it there. The disease spread with great rapidity and caused widespread losses. Two cases of DOURINE were diagnosed, the first for five years. The source of infection was not discovered. SWINE FEVER, which had been kept under control, reappeared in a severe form with a mortality sometimes over 50%. Cases of RABIES were numerous because of the difficulties of controlling the dog population. SHEEP SCAB has been systematically attacked since 1932. A dipping campaign has been organized. Again there were no cases of CATTLE PLAGUE, BOVINE CONTAGIOUS PLEURO-PNEUMONIA, GLANDERS or SWINE ERYSIPELAS.

PIROPLASMOSIS, especially THEILERIASIS, was particularly severe, with a mortality of sometimes over 60%. Although preventive vaccination against it as well as against ANAPLASMOSIS and BABESIASIS is offered, and only the cost of the vaccine is charged, the number of animals vaccinated was just 250.

Considerable loss was caused, especially among lambs, in two very large sheep farms by ULCERATIVE STOMATITIS, 99% of the animals becoming infected. ARTHRITIS in lambs, SALMONELLOSIS of lambs and kids, and BONE CACHEXIA of cattle were reported and, for the first time, AUJESZKY'S DISEASE was discovered by the Arloing Institute in a dog from the district of the Magods.

The therapeutics of both internal and external PARASITIC DISEASES continues to be studied, and a large range of chemicals was again used. Diseases of fowls and rabbits received attention. Twenty-eight cases of LEISHMANIASIS in dogs were diagnosed.—G. W.

PANAMA CANAL ZONE. (1940). **Report of Work on Animal Pathology at Gorgas Memorial Laboratory, 1938-39.** [CLARK, H. C.]—*Rep. Gorgas Mem. Lab. 1938–39.* pp. 4–5 and 10–14.

At the Miraflores veterinary station work proceeded on EQUINE STRONGYLOSIS [no details].

In the Department of Protozoology a study of *Trypanosoma hippicum* was continued. After 159 g. pig passages it was suddenly noticed that the kinetoplast had been lost. Virulence for horses and swine was unimpaired after this change.

In the Department of Helminthology, work was done on EQUINE PARASITES. A helminth survey was made on dogs in Panama; HEARTWORMS (*Dirofilaria*) and HOOKWORMS predominated.

The station is used as a breeding place for small experimental animals.—J. E.

BOOK REVIEWS

SCHREYER, W. [Dr. med. vet. Wertach (Bayern)]. (1939). Uebele-Handlexikon der tierärztlichen Praxis. 2. Band. [**Uebele's Handbook of Veterinary Practice. Volume II**]. pp. iv+520. Ulm, Donae: J. Ebner'sche Verlagsbuchhandlung. [8vo].

This is a companion to volume I which was reviewed in *V. B.* **9.** 444. It is an index to diagnosis and treatment of animal diseases arranged alphabetically. It is very comprehensive and not discriminative in its advice on treatment, a choice having to be made from many drugs and prescriptions.—J. E.

EDWARDS, F. W. [Sc.D., F.R.S., Department of Entomology, British Museum (Natural History)], OLDROYD, H. [M.A., Department of Entomology, British Museum (Natural History)], & SMART, J. [Ph.D., Department of Entomology, British Museum (Natural History)]. (1939). **British Blood-Sucking Flies.** pp. viii+156. 64 text figs., 50 figs. on 45 plates, 2 appendixes. [Numerous refs.] London: Trustees of the British Museum. [8vo] [15s.]

This book, which replaces the earlier work by E. E. AUSTEN (1906), forms a useful reference work for both the specialist and non-specialist. Although avoiding technical terms where possible, it is comprehensive in its range and includes keys for identification of both sexes,

or, as in the Tabanidae, of the females, of every biting species known to occur in Britain. The book contains three separate sections, each written by one of the authors. They deal with (1) the Culicidae (gnats), Ceratopogonidae (midges) and Simuliidae (black flies), (2) the Tabanidae (horse flies and clegs), and (3) the Muscidae (biting flies), Hippoboscidae and Nycteribiidae (parasitic flies on mammals and birds).

In view of the very considerable additions to the lists of British species since the previous edition, this work is an important and timely contribution. It includes accurate notes on distribution and brief summaries of available information on the habits of each species, along with notes on control and preventive measures.

An appendix by EDWARDS gives notes on the male genitalia of all the British and some European species of *Culicoides*, and there is a short appendix by the late Major E. E. AUSTEN on the origin of " gadding " in cattle.

—JOHN MACLEOD.

MCCOLLUM, E. V. [Ph.D., Sc.D., LL.D. Professor of Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University], ORENT-KEILES, Elsa [Sc.D., Associate in Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University], & DAY, H. G. [Sc.D., Associate in Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University]. (1939). **The Newer Knowledge of Nutrition.** pp. ix+701. Numerous figs., tables, graphs, 1 appendix. [Numerous refs.] London & New York: Macmillan Co. [5th Edit.] [8vo] [$4.50] [21s.]

This standard text-book on nutrition first appeared under the name of the senior author (MCCOLLUM) in 1918 and with each successive edition the subject matter has been entirely rewritten in accordance with the title of " The Newer Knowledge of Nutrition ". The authors have given a concise survey of the field and have faithfully recorded the facts and opinions expressed in what they consider to be the more significant original publications, reducing to a bare minimum the protocols of the experiments from which the various conclusions are drawn. In general terms the field covered includes information on the various nutritional requirements of certain animal species, including man; the dietary properties of foodstuffs; the characterization of malnutrition due to specific or multiple deficiencies; the occurrence of various types of malnutrition in different parts of the world, and the methods of dealing effectively with these nutritional problems.

In particular scope the authors have considered the history and development of the science of nutrition; the nutritional importance of carbohydrates, fats, proteins and minerals, including the " trace " elements; vitamins; the dietary properties of foodstuffs; dietary habits in relation to tooth metabolism and longevity; and a consideration of normal and perverted appetite. Some valuable figures on the nutritional properties of various foodstuffs are given in the appendix and each chapter is plentifully provided with cross-references to original publications.

As human nutrition has been the primary concern of the authors, those whose interests are primarily concerned with the nutrition of the domesticated animals may not necessarily agree with the presentation of the evidence dealing with various animal diseases. It is not yet proved that " pining " in sheep is " due to deficiency primarily of Co ". There is no reference to any British work on hypomagnesaemic tetany. The hypocalcaemia associated with milk fever is regarded as a calcium deficiency. In considering the questions of F intoxication there are no references to the " darmous " of North Africa nor to the " gaddur " of Iceland. The association of Cu with " swayback " in lambs is not mentioned.

Nevertheless, and with these limitations apart, the book remains one of the most valuable reference works of its kind on nutrition. One feels that the aim of the authors " to prepare a concise survey of the field of nutrition . . . more extensive and more inclusive than any other now available " has, to a large extent been realized. Every *Veterinary Bulletin* reader interested in nutrition in its widest aspects will do well to remember that this book constitutes a storehouse of concise, readily available information.—ALFRED EDEN.

ANDERSON, A. K. [Ph.D., Professor of Physiological Chemistry, The Pennsylvania State College]. (1939). **Essentials of Physiological Chemistry.** pp. ix+323. Numerous figs., tables. [Numerous refs.] New York: John Wiley & Sons, Inc.; London: Chapman & Hall, Ltd. [2nd Edit.] [8vo] [16s. 6d.]

As an introduction to the study of physiological chemistry, this modestly sized book is

amongst the best of its kind. It is assumed that the reader has some knowledge of general inorganic and organic chemistry. Although written for students of human nutrition it is designed to furnish " a background for future courses in dietetics and nutrition " and it is hoped that it will prove of value in more general courses in animal biochemistry suitable for pre-medical, agricultural, bacteriological, and other biological students. In the previous edition the author deliberately avoided presentation of controversial subjects even to the extent of leaving the impression that the explanations presented were final, and the same policy has been followed in the current edition, which has involved the rewriting of many of the sections and the addition of some new material, details of which are given in the preface.

The ground covered follows along the more conventional lines. The material dealt with includes some aspects of physical chemistry ; the principal classes of food constituents and their metabolism ; enzymes ; digestion ; absorption ; calorimetry ; tissue composition including blood and urine ; vitamins, and the endocrine organs. Without giving much detail of practical work, the author has, nevertheless, explained the underlying principles of some of the commoner methods employed in physiological chemistry, supplying certain details which are frequently lacking even in the more advanced practical manuals. References are made to various standard text-books for supplementing the present subject matter without referring the student to original papers, which, in the author's experience, he rarely takes the trouble to read.

The whole treatment of the subject matter has been carried out with obvious sympathy and understanding for the beginner, and the style of the book reflects the attitude of a sound and patient teacher whose main objective has been not so much to cram a maximum number of facts into a given space as to ensure that the reader completely understands the material presented.

The book may be confidently recommended to veterinary and other biological students, and indeed, to anyone wishing to acquire some knowledge of the essentials of physiological chemistry.—ALFRED EDEN.

McDONAGH, J. E. R. [F.R.C.S.] (1940). **The Universe Through Medicine.** pp. 389. 4 plates, 7 tables. London : William Heinemann (Medical Books) Ltd. [4to] [25s.]

The theories advanced in the author's previous work, " The Nature of Disease " (1924–34) are here extended, and correlated with recent work in chemistry and physics to reach a conception of the universe and of the attributes of activity which has led to its development : " Seeing that man is a product of the condensation of activity, nothing can come within his purview except activity ". The universe is pictured as being originally filled with activity, and every mass therein is regarded as a product of the condensation this substance is undergoing. Activity is described as having three functions which the authors call " attraction ", " storing " and " radiation ". The terms " negative charge ", " basic action " and " cold " can be applied to the behaviour of activity when the function of attraction is displayed, and " positive charge ", " acid action " and " heat " when the function of radiation is exhibited.

Activity is visualized as having travelled through six segments of a circle, subatomic products being formed in the first segment, atoms in the second, molecules in the third, colloids in the fourth, vegetables in the fifth, and animals in the sixth.

The whole book repeatedly reverts to the theory that the protein particles of the sap of plants and the plasma of animals are the first line of defence of the hosts against an invader, and that disease is caused by these particles being made to undergo dehydration followed by hydration and rehydration, and finally, if recovery occurs, the particles are dispersed. The action of drugs is considered to be due to their ability to act as attractors, storers, or radiators of activity, and on that account to correct the damage done to the protein particles. In the section devoted to the third, or molecular segment of the circle the composition of various drugs is very fully discussed.

The picture presented of the universe, life and disease, has much in it that is attractive, but when it is suggested that vitamins and hormones are waste products of the plant and animal systems, and, in health at least, fulfil no essential function, and that the manifestations of acute disease in cattle, *viz*, rinderpest, malignant catarrh, and foot and mouth disease, depend on the physico-chemical change the protein particles are made to undergo by the activity of the pathogenic mutation forms of *Bacterium coli commune* inhabitating the intestines, our faith in this general conception of the universe is somewhat shaken.—U. F. R.

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